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**DIDACTIC SEQUENCE DESIGN FOR THE DEVELOPMENT OF ACADEMIC
TEXTS READING WITH A GENRE-AND-CONTENT-BASED APPROACH
FOR LIFE SCIENCES UNDERGRADUATE PROGRAMS OF UNIVERSIDAD
DEL VALLE**

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ABSTRACT

The project of this work was to design and evaluate a didactic sequence for the development of reading in a context of English for Academic Purposes (life sciences undergraduate programs) at Universidad del Valle. This work was carried out considering three main phases: a needs analysis phase that aimed at establishing a characterization of the target students group, secondly, a design phase through which the treatment of two main conceptual frames, content and genre-based approaches to the study of written texts was set to be the core for this project and finally, a third phase in which an evaluation of the design results was effectuated by specialized revisers. In this manner, this work offers a clear overview of the particularities that are rooted to very specific social groups in terms of language teaching and learning; these particularities are taken into account through the implementation of the approaches considered here; a genre-approach that capitalizes the orientations of an academic group with special discursive characteristics and a content approach that synthetizes the terminological and conceptual frames into which English teaching efforts are comprised. Thus, these design results exhibit a model of lesson organization in which figures for structural analysis called “rhetorical functions” are introduced as a mechanism to examine specific textual frames in specific study fields, namely, life sciences textbooks.

Keywords: Rhetorical functions, life sciences, textbook, specialized language, needs analysis, integration.

RESUMEN

El propósito de este trabajo fue diseñar y evaluar una secuencia didáctica para el desarrollo de la lectura en un contexto del Inglés con Propósitos Académicos (para programas de pregrado de ciencias de la vida) en la Universidad del Valle. Este trabajo fue llevado a cabo tomando en cuenta tres etapas principales: una fase de análisis de necesidades que buscaba establecer una caracterización del grupo de estudiantes foco, a continuación una etapa de diseño a través de la cual el tratamiento de dos marcos conceptuales, el enfoque de contenido y el enfoque de género para el estudio de textos escritos, fue elegido como núcleo del proyecto y finalmente una fase en la que se detalla un proceso de evaluación de los resultados del diseño por especialistas. De esta forma, este trabajo ofrece un claro panorama de las particularidades que están arraigadas a grupos sociales específicos en lo que a la enseñanza y aprendizaje del lenguaje concierne. Estas particularidades son tomadas en consideración a través de la implementación de los enfoques que aquí se consideran: un enfoque de género que capitaliza las orientaciones de un grupo académico con características discursivas especiales y un enfoque de contenidos que sintetiza los marcos terminológicos y conceptuales en los que la enseñanza del inglés es enmarcada. Así es como los resultados del diseño exhiben un modelo de organización de lecciones en el que figuras para un análisis estructural llamadas: “funciones retóricas” son introducidas como un mecanismo para examinar marcos textuales específicos en campos de estudio específicos, a saber, libro de texto de ciencias de la vida.

Palabras clave: Funciones retóricas, ciencias de la vida, libro de texto, lenguaje especializado, análisis de necesidades, integración.

1 THE RESEARCH PROBLEM

The course *Lectura de textos académicos en inglés II* (ESP) has been the axis of foreign languages teaching during almost half of a century at Universidad del Valle. ESP program at this institution began offering English courses for medicine and biology that emphasized on particular topic domains belonging to these study fields, the thematic elements that were taken into account for then so were the main outcome of a needs analysis carried out according to rather informal search tools. Eventually some other programs were being benefitted from this kind of improvements in the English approaches the foreign language courses were providing AT the university.

However, according to several conversations with some members of different teacher faculties from different academic programs there was still the sense, from the teaching staff, of being dealing with groups of students that could not handle the minimum challenges in their classes when it came to interact with the foreign language. Some of the teachers comment on a students' incapacity to perform a variety of activities in the foreign language during the course of the undergraduate programs they were subscribed to and, even worse, an incapacity to perform a successful role as a professional once the students are done with their studies.

The issues mentioned by these teachers aroused a concern about the curriculum policies that were regulating the education in a foreign language at Universidad del Valle. If it was already well known that the institution had been working on a very well established program for EAP (English for Academic Purposes), why were there so many concerns about the students' performance? This drove me to approach some of the people that were involved with EAP work in the institution during the last decade at the university in order to know what were their thoughts on the science faculty teachers' concerns.

Some of the EAP teachers I spoke to were in common awareness about specific facts but the unsatisfying performance of the students a higher levels was not one of them. EAP teachers shared their thoughts about the lack of proficiency of the sophomore students in relation to the foreign language they were being put in front of, English. EAP teachers say that the majority of the students come from public institutions in which there is a poor treatment of foreign language education. EAP

teachers also share a common goal in relation to this, the need of preparing the students basic foreign language skills became then a priority, and in view of the apparent lack of proficiency of the students fulfilling this necessity seemed to take the whole sequence of courses offered by the university. Notwithstanding, there was an interesting question that came about these previous facts. What were the EAP teachers referring to when they said that the students joined the institution with a lack of proficiency in the foreign language?

The EAP teachers had also agreed that the students were failing to fulfill the expectations set over them as foreign language performers but yet it was not clear in which specific kind of scenarios the students were expected to perform a successful foreign language proficiency, there was no obvious nature in any of this if we take into account that English for Specific Purposes, as a study field, already suggests a specificity in the way language is approached, applied and developed.

The EAP teachers brought up a series of achievements students were expected to reach as foreign language speakers, and these ones were strictly linked to the profile the students were expected to create according to the experts of their particular academic programs. At this point it was evident that there was a lack of coherence between the University efforts to supply a particularized foreign language education and the specific necessities of each academic program and their students.

Therefore, this project departs from a point in which it is not only clear that there must be a new proposal for foreign language teaching in EAP contexts at Universidad del Valle, a proposal that takes into account the very specific situations and moment in which each academic program is placed with their alumnae.

RESEARCH QUESTIONS

Which types of genres constitute a necessity in reference with the course project according to the target population?

Which contents turn out to be necessary to be implemented in the course *Lectura de Textos Académicos en Inglés II* for the biology undergraduate program at Universidad del Valle based on the target student population?

Which linguistic issues are required to be displayed through the course proposal according to delimited genre frames?

How can be both specific and linguistic contents integrated into one systematic proposal?

2 ESP IN COLOMBIA AND AT THE UNIVERSIDAD DEL VALLE

English for specific purposes has been framed as a learner-centered approach to teach English as a foreign or second language. This approach has been constructed to meet the necessities of adult learners with specific needs, all of these entailing the learning of a foreign language that is aimed at a particular use in a specific field: sciences, arts, and business, among others. ESP has constituted an alternative approach in EFL methodology since its beginning in the 1960's and it has been widely diffused and applied. In Latin America, this field was embraced in the 1970's in view of the placement of innovative trends in EFL. With the support of the British Council and the attendance of more than twenty-five Latin American institutions and experienced authors of other countries such as, Widdowson, Munby and Trimble, several meetings were held in Paipa-Boyacá in 1977, where the prospects and progresses in the discipline were exposed and discussed.

English for Specific Purposes is justified according to three main reasons stated by Hutchinson and Waters in their *English for specific purposes* work (1987), as following: the increasing relevance of English language, the recent precepts in language studies and the current conjectures about learning processes proposed by Educational Psychology.

Right after the end of World War II, the development of industries concentrated on science, technology and commerce research began to demand the appropriation of a common language to improve international associations. The expansive growth of the United States economy and the oil crises during the 70's pushed forward English language to be the most spoken language in the world. Works on language yielded new assumptions in reference with the way language was supposed to be introduced when taught so as to make the students' necessities and conditions get acquainted with it.

The grammar focus then embarked upon taking another course considering that new studies reflected the importance of understanding how language was being employed in real communication settings. Widdowson (1973, 1979) performed several studies striking for this change and the main contribution of these works was that recognition of language diverging in different ways from one context to another. That

being so, language programs had to be underpinned on the features enclosing language in specific circumstances.

During the 1960s and the 1970s some projects about the varieties of language use were accomplished by Barber (1962), Torres (1964), Swales (1971), Trimble (1985) and Selinker (1976). The previous ones focused on the fields of Science and Technology therefore setting up the beginning of EST (English for Science and Technology). Educational Psychology fostered this discipline disclosing very explicitly the role of students along their learning processes. Students were supposed to uncover diverse needs and interests which interfere in their urge towards learning the language. Consequently, course design should embrace such needs and for shaping its curricular frames examining materials taken from their specific areas was essential. This depicts one of the principles scaffolding ESP teaching at higher levels of education.

ELT methodology has come about swayed by different influential disciplinary fields in the course of last twentieth century, expressly: applied linguistics, philosophy, pedagogy, psychology etc. Below the contributions of the language learning theories that have permitted the maturing of several paradigms in ESP practice.

The impact of ESP in Colombia, years before the seminar in Paipa, led to diverse projects related to the development of theories and trends in accordance to the themes exposed in the seminars. A paramount project at the time was sponsored by the British Council with the guide of Henry Widdowson (1980). It consisted of the design of a set of materials specialized in ESP named *Discovering discourse: Reading and thinking in English*, a series of four books forming a course in reading comprehension for students of English as foreign language. Based on discourse analysis this material intended to prepare a learner in the technical English in textbooks, reports and journals. The series develops the reading strategies in the learner and does not engage a single subject-matter but provides a variety of content. In addition to this, it takes the learner through four levels. Concepts in Use (near-beginner) practices the use of basic grammar and vocabulary through the reading of short passages in which basic concepts of simple English are expressed. Exploring Functions (pre-intermediate) presents certain communicative functions also common in the academic writing such as: instructions, descriptions, exemplifications, comparing and explaining. Discovering Discourse

(intermediate) enhances the contents and the strategies learned in the previous level in order to encourage the learner to apply them in more authentic situations. Discourse in Action (advanced) exposes the discourse typologies encountered in academic texts in both simplified and authentic material in order to guide the learner into more realistic study assignments. The importance of this series is acknowledged by many institutions and authors by its presentation, innovation and the diverse contents studied, such as biology, geography and social sciences.

Two other publications gained recognition in the field. The *ESP Journal (ESP)* A 26TH year-old international journal established in the discipline of applied linguistics and published in the UK by Cambridge University Press, covering all branches of the ESP subject in order to picture the overview of ESP background and its future developments. *The ESPecialist*, a journal published twice a year in Brazil in which reports of the work produced in that particular area are presented. Both publications present works related to discourse analysis, program descriptions, needs analysis, syllabus design, materials, methods, testing and teacher training.

In a local overview, Universidad del Valle developed in the 1980's a pioneer project called ESPuvalle. A publication containing the theoretical developments and experiences that teachers and researchers of the university shared with the objective of making of ESP a wider discipline in the region. The following local publication **Revista Lenguaje** from the Escuela de Ciencias del Lenguaje also was not specially dedicated to ESP as the other journals, but it has published since its emergence in the 1970's any different articles concerning ESP work at the university, especially related with the reading comprehension in English. A group of teachers published *La Enseñanza de la Comprensión de Lectura* (Escorcía et al., 1978). They presented some aspects affecting Reading comprehension and some useful hints to improve the performance in this process. Professor Blanca de Escorcía (1991) published "La Lectura Como Forma de Acceso al Conocimiento". She states different considerations regarding the Reading process' purpose in higher levels of education. Harvey Tejada and Jonathan Deer (1998) published "Comprensión de Lectura en Inglés con Propósitos Académicos: un Enfoque Aplicado a Administración de Empresas". Conceived from a holistic perspective based on interactive models of reading, they present an experience of a course design intended for graduate business students at Universidad del Valle.

The Foreign languages program at the Universidad del Valle gives only two close antecedents of monographs in the ESP area. The first was Paula Rojas' work on Genre analysis where she presents a complete study on the patterns that influence native Spanish speakers writing research article introductions in English. Rojas takes into account the four-move model proposed by John Swales (1981) where she compared the rhetorical structure of article introductions in Spanish with that proposed by Swales (Rojas 2003).

The second was Luis Benavides' pedagogical proposal for English teaching at technical schools (2004). He presents four units focused on reading comprehension which may help to develop reading strategies with the identification of different text typologies.

3 PREVIOUS WORK

3.1 ESP MATERIALS

Local efforts to develop proposals for a ESP approach to foreign language teaching at a university level have seen different kinds of faces at Universidad del Valle, each one of them have presented important elements to be recognized as an improvement to the work carried out until then in the specific area, yet many aspects are worth to be mentioned as aspects to be reconsidered for future projects like the one I aim at completing here. I will examine briefly the project framed in three local materials composed by English teachers of Universidad del Valle during the last two decades: *Medical English: Conversational and Scientific Discourse* by Zuluaga, Mera and Abouchar (1994), *Inglés Para Propósitos Específicos. Biología Para Inglés* by Mejía and Cobo (1988) and *Inglés Para Propósitos Específicos. Ciencias Naturales. Inglés I* by López, Candamil, López, Patiño and Rangel (1986).

Medical English: Conversational and Scientific Discourse (Zuluaga, Mera & Abouchar, 1994) constitutes an ESP learner-centered auto-instructional manual proposal which appoints at an improvement of reading skills. In virtue of this proposal the authors seek to strengthen the students' autonomy and efficacy as a reader by means of the implementation of reading strategies and resources that conduct to emotional and affective experiences that, as contextualization into the EFL domain, may guide the student along the line of an elaboration of the so-called communicative competence. The authors draft a basic didactization of their proposal in conformity with three basic sections: a comic strip section that attempts to establish pertinent connections between psycho-affective factors in the students in reference with their academic world, a debate-and-dialogue section that aims at stimulating oral skills as well as giving aids in an attempt of sociocultural contextualization, and finally the work proposes a scientific texts section in which students are expected to familiarize with basic communicative functions in medical discourse along with the constituent linguistic rules that delimitate them.

Medical English: Conversational and Scientific Discourse (Zuluaga, Mera & Abouchar, 1994) does certainly propose a line of work in ESP that makes an effort for

fostering the role of the student as a nuclear piece in EFL teaching, yet the characterization of this proposal does not respond to an accurately contextualized needs study. Even so the scientific texts are definitely generating a contextualized space for the students to explore aspects of their own study field in a foreign language; the didactic proposal does not offer the possibility of developing abilities that allow the students to cope with specific medicine texts or authentic materials. The authors suggest a series of contents that may assure interest in the student but that do not constitute a valuable response to objective necessities in the target population, and with this, specialized vocabulary/terminology does not represent a pertinent conjunction of terms that might solve the students' current and most demanding urgencies in their study field and in reference with EFL. Likewise, the pertinence of the genre choice of the selected scientific texts proposed in the material might be also prone to be questioned if it is considered the fact that each of the textual choices does not really respond to the specificities yielded by an analysis about genres in particular contexts.

In relation to the above, *Inglés Para Propósitos Específicos, Biología para Inglés III* by Mejía and Cobo (1988) may be credited as successful in correspondence to a sharper articulation of the materials' project with the most specific traits of the population they were designed for and the discourse environment entailed in this case. Here it is depicted a series of aids for a course proposal, these are framed into the EAP domains whose particular target is third-level students attached to the Universidad del Valle's biology undergraduate program.

This course proposal outlines as its emphasis some of the elements at the moment already established for EAP teaching in the mentioned institution, that is to say, the development of reading strategies is ascribed to the main work of the course. This proposal adopts as principle the analysis of genres justified by the particular relationship between the biology students and the scientific texts they are often exposed to. Based on this discourse criterion the author suggests for this course the treatment of genres such as the research report and scientific article.

The authors allude to the needs analysis basis of the proposal as a prospectus that makes an attempt of fulfillment of the biology students' academic necessities in reference with English into the program, nevertheless, the authors do not point out to

which analysis criteria they have opted for setting up for the selection of specific contents of the area. Furthermore, the authors mention that the Biology program requires an adequate oral comprehension as a justification for the selection of the interview for the enhancement of this skill to be incorporated in the course program.

There are two categorical facts that are worthy to be pointed out. Firstly, even though a discourse consideration is seized for the sake of the project there is still an absence of content work, and this represents already a disadvantage for students that are aiming at conceptualizing a specific study field, this absence of specific content work is an incapacity of the student to approach his or her particular field with the terminological knowledge necessary to be successful communicating and transforming what he or she deals with.

Secondly, although an analysis of particular needs is taken into account in Mejía and Cobo's project, the analysis must have still lacked ethnographical hints in order to contrive a more accurate perspective of, for example, what kinds of elements are important to be included in the project not only taking into account the specificities of the students' academic program but also the particularities of their socio-economic conditions. For instance, what are the real necessities of these Universidad del Valle students in terms of skills according to the facilities, economical resources and physical dispositions of the institution?

Finally, López et al. (1986) have expounded an opening set of scientific-oriented courses in the interests of the project of ESP refinement of the English teaching in Universidad del Valle departing from the very first level which is named *Inglés Para Propósitos Específicos – Ciencias Naturales. Inglés I*.

The designing criteria deemed to be definite for the purpose of the ESP course in the university is thought as an interrelation among several aspects: what does the target group need English for? What do they need to learn? Linguistic aspects, thematic aspects, desired level and the methodological considerations which are the guidelines that order the terms under which learning is carried out.

From this perspective, it is established that reading constitutes a normative language horizon considering the particular necessities of the University. Thus, so as to

achieve a higher level of theoretical coherence and methodological efficiency, the designers opted for implementing a diversification of two areas in terms of contents and materials: Natural and social sciences. Therefore this project by means of the contents involved with other programs ESP proposals such as agriculture, mechanics, chemistry, health and so on, conform a more expansive scheme that justifies the presentation of this rather diverse set of contents in facts such as the precept that students in first semester initially should get acquainted with the typical discourse in main sciences. According to this, authentic texts have been extracted from areas such as physics, chemistry, biology and mathematics.

Traditional criteria of simplistic grammatical organization have been deleted from the whole project and other criteria that correspond to the exhibition of real concepts and scientific activities are proposed. In accordance with that the organizational scheme of the information presents the textbook as the characteristic discourse in the book's project. The book's project aims at developing two types of activities, in the first place, activities seek developing reading strategies and secondly activities related with grammatical aspects.

Book units are displayed along three sections, reading strategies, properties and characteristics and finally structure, function and functioning. the first one responds to a simple premise and that is efficiency in reading is an essential objective according the project of these courses, the second and third one are proposed in accordance with the presentation style of the discursive genre embraced in the project, the textbook.

However, although it is evident that there is a systematic treatment of the concepts embraced through every activity the materials give the impression to be trying to point out at something at the same time that they point out to nothing. The categorization that the project generates about the specific fields the material is addressing is still vague or wrongly framed. EAP constitutes a special field in FLT in which reading and terminology represent a crucial aspect in the students' possibilities of success, these possibilities are partially annulated when topic generalizations are effectuated.

When students of different science areas are understood as a common frame of terminological work it is hard to think that they are going to develop the required tools

to exercise a fruitful approach to their specific study fields. The mathematics students will totally lack what the biology students may be exceling of.

Now, according to the three previous works I have capitalized a series of particularities that drive this project to propose certain improvements: Initially, it is important to acknowledge the priority of a sociological, economic and cultural consideration of the target population the materials or course is being designed for. Secondly, a necessity of considering a stronger discourse approach to language teaching, the way students interact with textual genres in ESP. In the same way, contents are determining in the way concepts and terminological background are established in the students profiles, in view of the above, contents are not supposed to be a subject of randomization.

3.2 RESEARCH WORK IN ESP

EAP works are more commonly envisioned from a research perspective nowadays. New trends in education and in face of the effects of globalization over educational possibilities have currently led to witness a considerable amount of projects I have found important to allude here. It was necessary to examine a broad assort of works in terms of social contexts, that is why the projects referred as following come from different continents: Poupard (2010), from the United States; Tarnopolsky (2009), from Ukrania; Shu-Chiao Sai (2012), from Taiwan; and finally, Herrera (2009), from Colombia.

EAP vocabulary instruction: a textbook analysis and lesson template by Poupard (2010) constitutes a careful proposal for a vocabulary-focused didactic sequence based on a conscientious examination of several selected textbooks from a vocabulary-based teaching perspective. This research work is aimed at designing a proposal intended for an upper intermediate academic population that aims at English as a second language. The author departs from several presumptions that depict his very strong emphasis on vocabulary as a main frame in language teaching, therefore, he reviews some important literature about vocabulary acquisition in order to determine specific guidelines for vocabulary instruction from which the textbooks analysis is strongly evaluated. The

final outcome then schematizes a model lesson for teaching vocabulary to EAP students. The author's proposal draws on the development of lexical knowledge as a main focal point of his pedagogical prospectus.

Poupard (2010) gathers an assortment of four textbooks proposed for high-intermediate students belonging to the college community of San Diego University. He makes a comprehensive description and evaluation of the learning purposes suggested.

The analysis of these four books is intended to be in light of the theoretical assumptions that foster guidelines for a vocabulary-based instruction. The textbooks are appraised considering the presence of the following parameters in each textbook: vocabulary assessment and presentation, repetition and spaced retrieval, activities that promote depth of processing and strategies for independent learning.

These design principles are subsequently considered for the lesson template proposed by the author, this template, according to the author, may be used to design an effective vocabulary component to a lesson and it is assured to be customizable for a virtual environment. This lesson prompt contemplates the following aspects: the author illustrates his vocabulary-based lesson model with the elaboration of a didactic sequence that draws on a text Poupard's selected from a textbook on contemporary human geography, a reading worked in a course that college multiple majors must take, so it is said to be a widespread treated piece of reading.

Poupard concentrates his effort to implement a vocabulary-based instruction developing a format of four stages in this lesson template: vocabulary presentation (target-word presentation, self-assessment and discussion of the words), receptive knowledge (reading passage and activities to promote receptive knowledge of each word), productive knowledge and finally vocabulary review.

As a first instance, target words are selected in accordance with particular precisions. The author makes use of Awl Highlighter, an online application that analyses texts and, based on lists of academic terminological sets chosen according to specific levels of recurrence, determines which vocabulary should be taught. Thereby, the author departs from a particular perspective for the selection of the target vocabulary that responds to a recurrence criterion. This selection might present several problems in

the sense that not necessarily the words that are more recurrent are the ones that demand an important attention as lexical units to be treated. As a matter of fact, in a process description text the process that is being described does not exhibit as many number of semantically significant units as other kinds of words that might be more recurrent and yet irrelevant.

Moreover, the lesson template proposed by the author already differs from the approach to which EAP designs are circumscribed nowadays. It adopts a perspective in which vocabulary constitutes a central point in which genres and contents, which are the main focus of an EAP course, do not contribute in a consistent manner.

The author transcribes the unit as a correspondence of sequences in which vocabulary is presented, practiced, and evaluated in context and the revised once again. Lexical units are presented practically isolated, this presents a benefitting approach for studying certain language issues, that is to say, conceptualization of ideas and terms that might be necessary for university students that require a specialized set of terminological units, however, leaving out of perspective all genre concerning about the target population, not to mention the absence of that content-based subject matter.

The next work I proceed to mention is Tarnopolsky's work (2009). Such work addresses a point that initially might be conducted as a kind of deviation from the premises that lead his/her work in the sense that the work attempts to fulfill the necessities of the students primarily as students of their specific program, and not exactly their necessities in view of their professional future, which might constitute a divergence point of departure from which contents and genres would be expected to reach different extents.

The author primarily meets the requirements of an ESP study design by evaluating the implementation of a textbook, *Psychological Matters*, whose target population is second and third-year students majoring in psychology, being the main axis of discussion in the author's work *content-based learning of English for future psychologists* and *Internet-assisted organization of the teaching/learning process*.

This material carries content matter such as *General psychology*, *Practical psychology*, and *psychotherapy* for the development of English in professional

communication. Such project remarks on a very important point on the course and material design, the goals are not only aimed according to the generic study field the students are involved with but also with the specific characteristics of the target population working in these domains, in this case, we do not talk about a content-based proposal for psychologists but a content-based proposal for Ukrainian psychologists, and this design precisions already establish an important trend that seizes more accurately the reality of the population and their particular needs.

It is worth mentioning that the author stresses the notion that reading constitutes the main emphasis of these type of ESP courses on the basis of which he/she states “*English for professional purposes is probably the most important communication skill that tertiary students majoring in psychology must develop*”.

Furthermore, Tarnopolsky introduces the usage of TIC, namely, *Internet-assisted language learning* as an instrument for providing an enriching learning device through which the gaps that textbooks reflect in terms of authentic materials and spaces are fulfilled from the hand of the extensive amount of authentic materials that are available through the internet. Likewise, the author clarifies that the usage of internet as a learning tool constitutes an effort for developing the four skills in a propitious space that permits this type of skills integration, in this instance: the internet.

Next project I revised was Sai’s research work (2012) in Taiwan. Sai confronts a testing of the effectiveness of a pedagogical project in EFL that aims at integrating an ESP courseware into a course for adult learners of two AFLD in-service programs, a four-year night-time program (NP) and a two-year weekend program (WP). The effectiveness of this type of integration is said to be evaluated in contrast with a teacher-centered instruction didactic proposal conducted for further comparison.

The structure of the ESP courseware includes three basic sections: an introductory overview in which three specific main topics are presented, the project’s core into which seventeen topics with multimedia movies and bilingual texts have been created and finally an on-line evaluation system which consists of listening tests and simple questions in multimedia game-like format, this latter contributing significantly to the metacognitive process of the students as well as evaluating their own progresses.

This type of integrative teaching adopts a CAI (Computer-assisted instruction) and SCLT (Sustained-content language teaching) approach through which two main components are conducted, being the first an specific subject area instruction and “language learning”, this is, “English Skills” and adoption of reading strategies.

The courseware-assisted proposal remarks some important aspects that guarantees the interactional process of language learning processes, however, this type of learning does not constitute a primary guidance for the students to acquire a relatively better understanding of the presented information about their particular fields (subject content), in these terms, Sai’s project seems to leave aside an important criterion for the conduction of an ESP course, and this is, the role of language in virtue of the specific matters that concern the students as regards their academic domains since Sai’s refers to a didactic project that does not offer initial language remarks in light of the addressing of particular academic affairs.

Another remark to be mentioned is the role of vocabulary and the procedure for this to be introduced in Sai’s proposal. Vocabulary is not recommended through a deductive procedure but rather, from a much stretched compendium of terms that present vocabulary completely isolated and whose memorization will constitute eventually the basis for further textual treatment. It is not even necessary to mention that ESP assumptions corroborate the fact that the text must be the vehicle for articulating inferior units and linguistic aspects students are concerned with, in this case vocabulary, namely, specialized vocabulary.

The author suggests that this specialized vocabulary will be provided in first instances from oral explanation which also constitutes an inconvenient point in favor of new vocabulary for non-native speakers, some authors suggest that vocabulary must be included bias written presentation when presented in EFL teaching. Now, in reference with this, so-called specialized vocabulary, the traits of this selected vocabulary from a departure point are not attached to a real and objective necessities-based proposal, what do these Taiwanese students need? The mere example does not initially reinforce the idea of a simplified but coherent needs analysis.

Herrera’s project (2009) aims at resolving the elaboration, implementation and evaluation of a didactic sequence for developing and improving argumentative texts’

writing in FLE with first-semester students of a program in Foreign Languages at Universidad del Valle. The study essentially departs from the acknowledgement of writing and reading processes in higher education as one of the most outstanding problems students are confronted to at this educational level, situation that is comprehended in this case as being more aggravating keeping in mind the fact that Foreign Languages students are required to contrive a much more definitional insight about the textual organization of specific types of texts.

TIC are therefore conceived in this project as a fundamental mechanism for negotiating knowledge in an impelling way, and by considering the advantages that this entails, the project looks after creating study environments through the virtual platform that may be eventually enriched by other users. In this way, Herrera brings to bear Lingweb course management system as an implement for improving writing teaching and learning dynamics. This tool offers two modalities the teacher and students can take advantage of, firstly a set of activities that intends to promote writing strategies following a step-by-step procedure. Secondly, the students may gain advantage from a second modality enclosed in the platform, the students are allowed to accomplish free writing activities with tools such as the forum, the diary, etc. in which students are at liberty to communicate with their classmates and teacher.

Herrera's proposal for fostering writing processes proposes an implementation of didactic sequences focused on expository and argumentative text writing, textual models and study guides that are consented to be enriched by eventual users of the platform. Herrera adopts Sanchez et al. approach to textual analysis by means of what they call textual sequences, he suggests a set of techniques proposed by Eschholz and Rosa (1998) through which the author elaborates the project on the basis of textual sequences, namely, explanatory textual sequences. These sequences are executed pursuant to a planning and development of guides, activities and materials that are side by side to their proper implementation.

In spite of the former projection of Herrera's work for a virtual environment implementation of the proposal, most of the project was carried out by means of physical templates. However, Herrera's project offers a pilot didactic sequence for the virtual environment itself. Considering the hierarchical disposition of didactic sequencing in Lingweb CMS: Courses -> Units -> Sequences -> Activities -> Exercises,

it was not until this pilot exercise, Herrera's fourth intervention, that Lingweb was not operated as the authentic agent for elaborating a legitimate work with language.

First step for the purpose of this pilot exercise was registering the course (Habilidades integradas en francés II) for the academic period February – June 2009 as well as the students who were in the environs of getting involved with the pilot practice. Having concluded this first stage of the designing phase of the course with Lingweb CMS, a unit and a sequence were formulated so as to be the recipient of four activities the author delineated. Likewise, a set of exercises were configured for the purposes of each activity. Guides, charts and materials are displayed by means of online web pages and text documents considering that the virtual environment did not possessed integrated work templates and it did not allow the assembly of charts or the open-answer text editor.

Lingweb CMS presents some interesting tools proposed for the sake of providing feedback to the users after having effectuated the intended activities, the possibility of uploading general commentaries about the exercise developed as well as submitting correcting precisions that run as co-evaluating mechanisms.

The sequence is deemed to be congruent and accessible at a technical level, the environment proves to be effortlessly maneuverable and easily discriminable when the user is aiming at taking over it from one hierarchical stage to another. Nevertheless, the environment, according to Herrera's annotations, is not substantially placing at the user's disposal a relevant disposition of elements that a physical environment could not steadily hold out. As a matter of fact, the author suggests that students involved with the fourth intervention, which was specifically the piloting carried out by means of the virtual environment, claimed to be somehow precluded from syntactic or orthographic correction tools into the platform.

Yet, Herrera puts forth some remarks about the strengths of the virtual platform, but these are categorically undeveloped, though the author refers to the environment in terms of strengths such as: "good organization, ease of the platform operation and fitness of its tools", it is imprecise how these aspects are delimited in a frame of pertinence. These are exactly mentioned to the extent expressed above and to that

degree is how the intervention happens to be evaluated with respect to the didactic sequence itself.

The previous works definitely serve me so as to sharp a model of design in which I already acknowledge aspects I should and should not apply for this work. For example: Poupard's work allowed me to conclude a reasoning from the aspects I considered wrongly conducted, for example, the criteria for the selection of specialized vocabulary to be presented to the students does not respond to a study of contents but rather to a very technical terminological procedure for scanning recurrent terms in a text. This, besides the fact of not approaching any genre or textual typology consideration for the design of the proposal, suggests a necessity of contriving a plan that departs from a macrostructural configuration of the text for progressively working on more specific aspects such as specialized vocabulary.

Secondly, Tarnopolsky's project constitutes an interesting example about how the foreign languages education at a university level can be shaped according to the particularities an academic field congregates. Content-based approaches represent a well-coordinated effort of how an English teacher can reach a population with specific necessities. Tarnopolsky offers a proposal that, in conjunction to virtual aids, configured a significant model to take into account for my project; obviously I should adjust mine to the specificities of the study fields I will deal with (*e.g.*, life sciences).

Thirdly, Sai's project contributes to my scheme with a set of assumptions that it arouses me after having corroborated several methodological situations in his work that I find inconvenient. How the vocabulary is presented in an EAP project is an issue of important precaution. Foreign language teaching in EAP delegates to the written domain of the learning process the task of consolidating a clear overview of the vocabulary is being presented. Students who are dealing with specialized vocabulary of an academic field need a clear visual contact with the terminology they are being related to. This is not an aspect to be displayed by aural procedures initially.

Finally, it was important for my project to study in which ways virtual tools are effective and particularly advantageous for a project like this. In accordance to this purpose Herrera's work allowed me to develop a clearer understanding of the kinds of advantages a virtual tool is supposed to offer and how important it is to establish a

conscious use of virtual environments pursuant to real improvements in comparison with physical environments.

4 OBJECTIVES

4.1 GENERAL OBJECTIVES

To design and evaluate a genre-and-content-based didactic sequence supported by physical and virtual materials for the acquisition of specialized terminology in order to improve reading comprehension in undergraduate students of a course of *Lectura de Textos Académicos en Inglés II* subscribed to Life Sciences programs at Universidad del Valle.

4.2 SPECIFIC OBJECTIVES

1. Identify which genres and textual typologies constitute a necessity in reference with the course project according to the target population.
2. Identify which contents and terminological features turn out to be necessary to be implemented for the target population
3. Identify which grammatical structures are required to be displayed through the unit proposal according to delimited genre frames.
4. Design and evaluate a systematic proposal that integrates specific contents (life science contents) and linguistic contents (text structures and grammatical structures).

5 THEORETICAL FRAMEWORK

Four main theoretical components are brought up to this work in an effort to compose a synthetic but substantial underpinning of this EAP project. Initially genre-based approaches are described in an attempt to explicit the main frames into which this project is thought in terms of the target population it is aimed at. Genre-based approaches are explained as a way through which present a contextualized proposal in regard of the need analysis research carried out. Secondly, communicative approach to language teaching is brought up so as to establish a methodological basis for integrating texts and contents according to the kinds of assumptions proposed by the genre-based approaches mentioned before. Thirdly, terminological precisions are considered for this work in view of the vocabulary particularities that are remarked in the needs analysis process. These particularities refer to conceptual specificities in the kinds of languages of specific study fields. Finally, some basic principles about the use of virtual aids in language teaching are depicted as an action framework for implementing computer-assisted activities supporting the didactic sequence.

5.1 GENRE-BASED APPROACHES IN ESP

Since the beginning, procedural attempts for the present project necessarily compelled a constraint for a situational perspective from which pedagogical designing alluded to the challenge of planning specific content-based courses for academic settings. Under such circumstances, the contingencies that are called forth are initially subordinated to the examination of particular language contexts.

These contexts are reckoned to be drafted by the specificities of several social frames that are considered to be influential over the whole language work students are exposed to. Thus, at this point, it arises the necessity of drawing on specific categories or language frames pertinent and useful for working with language in specific milieus. Here, genre-based and text-based approaches are deemed to be highly successful according to researches carried out by language theorists around the world who have being involved with contrastive rhetoric studies as well as ESP research works.

Some important authors have been taken into account in this project with some of the most important contributions of their works: John Swales, Ken Hyland, Tony Dudley-Evans, Tom Hutchinson and Alan Waters.

According to several empirical researches language differs from one context to another and in addition such variation has to do with specific areas of usage, namely, biology, medicine, economy etc. These differentiations in language are denominated *registers*. At this level, language studies consist of the description of grammatical structures applied in specific language registers, particularly in scientific English. Consequently, the starting point of ESP practice was dedicated to study the most frequent lexical and grammatical structures in such registers; this work was the basis for English for Science and Technology (EST).

Structural syllabuses have been applied during some periods until divergent ideas about language studies demonstrated that the knowledge of a language system was not sufficient for learners to embrace the target language in the best way. It was almost necessary to familiarize the student with the actual use of the language. Learners must possess the knowledge about how sentences were mixed to form paragraphs and entire texts as discourses (Dudley-Evans 1998). Dudley-Evans points to the key functions as appearing in discourse in scientific writing: definition, classification, description and hypothesizing.

Known as *Rhetorical and discourse analysis*, this subsequent level was mainly treated in written language as “the concern of research was to identify the organizational patterns in texts and the linguistic means by which these patterns are signaled”. (Hutchinson & Waters, 1978)

A pioneering work of such features was done by Trimble in *EST. English For Science and Technology: A Discourse Approach (1985)* where he sets up a process chart describing four rhetorical levels upon which writing is built and upon which reading may be taught. EST course design was based on the description of linguistic use in scientific discourse; in words of Trimble (1985), identifying the “characteristics that make scientific and technical English writing different from other forms of written English discourse”

5.1.1 SWALES' GENRE-BASED APPROACH

From the foregoing, genre-based definitions are brought up as a consistent resource in the underpinning phase of the project. Thereby, definitions provided by John M. Swales (1990) have turned out to be more than convenient. That being so, three main concepts are considered pertinent for the objectives of this work: discourse community, genre and task.

“Discourse community” is introduced by the author in his *English in Academic and Research Settings* study regarding the steering of course design for Specific Interest Groups. A discourse community is characterised by six referential features according to Swales (1990, p. 24):

1. Broadly agreed set of common goals.
2. Mechanisms of intercommunication among its members.
3. Use of participatory mechanisms primarily to provide information and feedback.
4. Possession of one or more genres in the communicative furtherance of its aims.
5. Acquisition of specific lexis.
6. Threshold level of members with a suitable degree of relevant content and discursal expertise.

The definition of discourse community proceeds as a main concept that stands for an opening moment in the development of an EAP project, the so-called Needs Analysis stage from which EAP schemes are disclosed. In this manner, a discourse community is tried to be brought into focus through a sort of inquiry, inquiry that attempts to contrive factual information related to the previous six aspects. The above, in order to outline a definite presumption about the type of target that is being aimed at along the then-on prospective educational undertaking.

Genre-based approach, as proposed by John M. Swales (1990), provides a very conductive definition of genre and a clear frame of reference for the structuration of the didactic sequence:

A genre comprises a class of communicative events, the members of which share some set of communicative purposes. These purposes are recognized by the expert members of the parent discourse community, and thereby constitute the rationale for the genre. This rationale shapes the schematic structure of the discourse and influences and constrains choice of content and style. Communicative purposes are a privilege criterion and one that operates to keep the scope of a genre as here conceived narrowly focused on comparable rhetorical action. In addition to purpose, exemplars of a genre exhibit various patterns of similarity in terms of structure, style, content and intended audience. If all high probability expectations are realized, the exemplar will be viewed as prototypical by the parent discourse community. The genre names inherited and produced by discourse communities and imported by others constitutive valuable ethnographic communication, but typically need further validation. (1990, p. 58)

Genre is then here conceived as a series of academic events that interrelate undergraduate students with specific knowledge of their fields through specific texts. Therefore the genres comprised in the activities into which these students are involved with are the main focus of attention when developing a proposal for them.

Furthermore, the definition of “task” is comprehended under the interests of a study planned for designing goals. A task, as it is proposed by the author into his EAP work scheme, consists on: “One set of differentiated, sequenceable goal-directed activities drawing upon a range of cognitive and communicative procedures related to the acquisition of pre-genre and genre skills appropriate to a foreseen or emerging socio-rhetorical situation” (1990, p. 76)

5.1.2 HYLAND’ S GENRE-BASED APPROACH

In his work, *Genre and Second Language Writing*, author Ken Hyland (2004) mentions that linguistic patterns are seen as pointing to contexts beyond the page, implying a range of social constraints and choices, so students are offered a way of seeing how different texts are created in distinct and recognizable way in terms of their purpose, audience and message. In this way, the author says that genres also offer a principled way of determining the content and organization of a writing course by basing

instruction in the typical patterns and choices available to students in the texts they will need to write.

The author states that genres are social processes because members of a culture interact to achieve them, they are goal-oriented because they have evolved to achieve things, and they are staged because meanings are made in steps and it usually leads writers more than one step to reach their goals.

According to the author's assertions, it is understood that extensive analysis of writing has shown that diverse kind of texts are differentiated by distinctive patterns of vocabulary, cohesion and grammar. These patterns structure the texts into stages, and in turn, each stage supports the purpose of the genre.

Hyland proposes a Genre pedagogy based on Systemic-Functional-Linguistic characterizations from which it has been developed a pedagogical approach in which teacher has a central role in "scaffolding" the student development through a cyclical process (2004, p. 34):

Contextualizing the genre through activities such as prediction tasks, problem solving activities, site visits, etc., that reveal the purpose of the genre and the situations in which it is found.

Modelling appropriate rhetorical patterns of the genre to reveal its stages and their functions (comparing texts, sequencing, activities, etc.)

Providing guided practice in writing the genre through role plays, information-gap tasks, group construction or completion activities, etc.

Withdrawing to allow students to write independently (planning, drafting, and editing texts; peer critiques) in realistic contexts.

Hyland offers an interesting concept, he proposes as Genre Knowledge. This kind of language are recognized types of communicative actions, Genre Knowledge is knowledge of the culture in which writers, readers, and texts are found, and the following sections explore the main elements of this knowledge (2004, p. 56):

Knowledge of the communicative purposes that the genre is commonly used to achieve.

Knowledge of the appropriate forms that are needed to construct and interpret texts.

Knowledge of content and register.

Knowledge of the contexts in which a genre is regularly found.

In this way, the author proposes two starting points or a Genre-based approach:

1. *Theme-Based*: Genres are selected and sequenced by learner needs and the demands of the theme.
2. *Text-Based*: Genres are selected and sequenced according to those found in a relevant real-life context or according to increasing levels of abstraction or difficulty.

5.2 COMMUNICATIVE LANGUAGE TEACHING

Communicative Language Teaching has been narrowly linked to EAP approaches with a premise of being fostering direct pedagogical experiences in real language setting when it comes to deal with the specificities of textual genres and typologies. Here communicative approaches are consolidated as a coherent proposal into which EAP efforts find a strong basis, these bases represent for this work a set of applicable precepts and methods in relation to the nature of language learning and the ways to enhance it taking into account constructivist perspectives of language acquisition in specific settings.

Communicative approach is illustrated out of the results of several researches on views of the nature of language and theories of language learning elaborated since the mid-sixties. Richards and Rodgers (1986) review the works of several British functional linguistics such as Firth (1957) and Halliday (1977) and scholars Austin (1975), Searle (1980), and Widdowson (1980). They bequeathed various precepts that remark how language teaching imposes a necessity to focus on communicative proficiency instead of plain mastery of structures. Moreover, North American sociolinguistics: Hymes (1974), Gumperz (1982) and Labov (1973) conducted a movement which created heavy criticism in reference with structuralism and transformational grammar.

Jack Richards presents in his work: *Communicative Language Teaching Today* (2006) a defining scheme of what communicative language teaching constructs are aiming to in terms of planning and design. Richards (2006) appeals in his work to a designation of certain interpretative and productive values a language user should be able to get engaged with, he calls it *communicative competence*, and this is described as (Pag. 7):

1. Knowing how to use language for a range of different purposes and functions.
2. Knowing how to vary our use of language according to the setting and the participants.
3. Knowing how to produce and understand different types of texts.
4. Knowing how to maintain communication despite having limitations in one's language (use of communication strategies).

In his work, Richards (2006) delineates two approaches to communicative language teaching through which several classes of instructions are exposed to the reader. For the purpose of this project, only two of those classes are alluded here, Content-Based instruction and Text-Based instruction. With this methodological unification is suggested considering an amalgamation of aspects of these two types of instructions presented as following:

5.2.1 Content-Based instruction

According to Richards (2006) , Content-Based Instruction is based on the following presumptions on language learning:

1. Language is learnt more efficiently when learners employ language as an instrument for collecting information instead of positioning as an end per se.
2. Content-Based Instruction must reflect the learners' necessities for approaching a second or foreign language.
3. Content should provide a reasonable framework that aims at developing and binding together all language skills.
- 4.

5.2.2 Text-based instruction

Text-based instruction is the specific approach has been conveyed a verbal image of in regards of English for Specific Purposes in the frame of Communicative Language Teaching methodologies described by Richards. According to the author, communicative competence acquires in this dimension a command on particular types of texts. No needless to say the definition adopted by the author of “text” and “type of text” is referred into the same estimations that are embrace in this work, “structured sequences of language that are used in specific contexts in specific ways” (p. 36). In accordance with Feez and Joyce (1998), quoted by Richards, assert Text-Based Instruction is supposed to be based on the following premises:

1. Grammatical features of spoken and written texts are in some way expected to be explicitly taught.
2. Socio-cultural contexts are expected to be linked to the treatment of spoken and written texts in the class.
3. Working on texts is supposed to be related to work on specific skills.

The genre-based approaches comprised above evidently share common goals: To constitute educational projects led by clearly established textual boundaries and these boundaries seem likely to be more precisely defined in academic contexts. To develop a real significant communication between the parts involved in writing and writing processes, in this way, genre-based approaches formalize community through texts. The approaches mentioned in this section appealed to a capitalization of important aspects to take into account in a project that aims at formulating a pedagogical proposal for EAP. Thus, it has been indispensable to recreate the past principles for developing this work.

5.3 TERMINOLOGY AND SPECIALIZED DISCOURSE

EAP is concerned with role of the levels of specialization referred in language discursive frames in the effectiveness of language acquisition. In these sense terminology constitutes a relevant ally field from which important precepts about the way concepts and specific language constituents are brought up to intermediate in the way language instruction is presented in academic fields. In reference with the above, very general precisions are conferred in this work aiming at a clear delimitation of the way concepts will be treated or valued in this project.

Lexical approaches to EST are related mostly to (foreign) language teaching and learning. Computer aided research and language corpora offer opportunities to look at specific ‘technical’ vocabulary beyond single words in any field. Data driven research has indicated that specialized lexis is better thought of as language prefabs or ‘formulaic multi-word units/collocations’ (Mudraya, 2006). Thus, technical vocabulary comprises words and collocations specific to one or closely related fields, with high frequency, specific meaning and typical collocation patterns.

According to Emma Rodriguez’ article (2003): “La terminología y la adquisición de conocimiento especializado” what legitimates an individual as a specialist is necessarily his or her capacity to represent the concepts and relationships that take place inside a topic frame, as it is his or her domain in the management of structures and expression forms characteristic of that specific field.

Rodriguez mentions that the specialists training entails the appropriation of terminologies and different expression forms of each specialty, that is to say, acquiring semantic distinction and all the stylistic and syntactic restrictions typical in each specialized register. According to Rodríguez terminology accomplishes two purposes in the learning process of a specific area as following:

1. Terminology allows to understand the contents of the distinctive concepts of an area.
2. Terminology allows the acquisition of means to propose once again, and according to the specificity of a different field, such concepts.

According to the author specialized language is understood as the set of all the linguistics resources that are employed in a specific field in order to assure the comprehension and communication among people who are related in that specific field. Rodríguez quotes Schmidt (1967) who states that specialized language is the most efficient communication means among specialists of a common study field. This specialized language is characterized by a specialized vocabulary, and special rules for the use, selection and frequency of the lexical and grammatical resources of common discourse, according to the author quoted by Rodriquez this specialized language does not exist as an independent language but on the contrary it is through specialized texts that this language is updated.

Emma Rodríguez defines what specialized text consists on, the author suggests that from a textual perspective a degree of specialization of evidenced in the macrostructure of the texts, the coherence relationships between the elements and the amount of syntactic, lexical, morphological, graphical and phonetic units that are used. That is how textual typologies are constituted giving birth to specific forms such as: university textbooks, scientific articles, practices manuals, reviews, summaries, contracts, medical reports, etc.

5.4 COMPUTER-ASSISTED LANGUAGE LEARNING

During the last four decades computer-assisted language learning (CALL) has increasingly acquired major importance with the conventionalization of learning materials and the access to them via electronic devices and virtual applications.

Increasing levels of specialization in the face of a maturing of principles that sustains computer-assisted design and evaluation have come to light. Many of the most significant technological developments arisen throughout the past 30 years have enhanced and diversified our ability to communicate. Language itself is comprised in this phenomenon of communication transformation, inasmuch as the traits technological revolutions express improve the way in which interactions are befall and how language is finally assembled to signify.

In this way, this project relates to CALL approaches to a degree in which there is also an acknowledgement of the conditions in which people are nowadays in terms of their demands for kind of communication that allows them to interact with information more efficiently. In this manner, CALL-based approaches are clustered in a place in which EAP can make use of methodological perspective for presenting language in language learning processes. How evaluation is enhanced looking forward to enhance the extent of possibilities of the student when constructing knowledge? That is the question addressed from CALL perspectives in reference with this project.

Computer-assisted language learning is comprehended from a perspective that considers the selection and application of a technological tool and operation that contrives specific learning factors such as: learning characteristics (goals, needs, background), features of the setting (laboratory, classroom, home), learning environment (technological, societal, cultural, institutional factors), target language, curriculum and teacher's conditions.

5.4.1 Designing Language-Learning Tasks

In accordance with Cohen's notions of "Multiple ability tasks" as it is cited in Levy and Stockwell's work (2006), socio-collaborative language learning anticipates the inclusion of the following aspects:

1. They display more than one answer or more than one way to unravel them.
2. They are necessarily intriguing, challenging, stimulating and rewarding.
3. They permit students to offer different contributions.
4. They make use of multimedia.
5. They include sight, sound and touch.
6. They demand a diversity of skills.

Mishan and Strunz (2003), cited by Levy and Stockwell (2010) described the elaboration of interactive resources for authentic language making use of *XML* (*eXtensible Markup Language*) to achieve so. Their design is prescribed in consonance with what is referred as an *authenticity-centered approach*. In such a way, the text

authenticity intended by Mishan and Strunz is aimed according to certain specific traits tasks were determined to involve in the design:

1. They should obey to original communicative purposes of the text.
2. They should offer a rehearsal possibility on real-life tasks.
3. They should clearly guide the student towards a goal or an outcome.
4. They should generate genuine “suspense as to their outcome”.
5. They should require natural interaction between the learner and the text.
6. They should promote genuine communication among the learners.
7. They should trigger the learner’s existing knowledge about the target language and culture.

5.4.2 Evaluation in CALL

Acoording to Chapelle (2001), quoted by Levy and Stockwell (2006) in their mentioned work above, CALL evaluation criteria is operated to specific improvements looking after three different aspects:

1. Combining the newest findings and theories on language acquisition and the right requisites for language learning.
2. Offering directions about how this criterion should be configured.
3. Warranting theory and criteria are in harmony with the software and the tasks proposed through it.

Chapelle (2001) presents an interesting perspective on CALL evaluation that is resolved by reason of five principles:

1. Evaluation of CALL is a situation-specific argument.
2. CALL should be evaluated through two different perspectives: judgmental analysis of the software and planned tasks, and empirical analysis of learners’ performance.
3. Criteria for CALL task quality should come from theory and research on instructed SLA.

4. Criteria should be applied in view of the purpose of the task.
5. Language learning potential should be the central criterion in evaluation of CALL.
(p. 52)

5.4.3 Social and psychological dimension

Levy and Stockwell (2006) argue on how different types of CMC adjust according to the social and psychological of the learners' profiles. According to Doughty and Long (2003), cited by Levy and Stockwell, "the choices among the numerous technological options... need to be based, in part, on psycholinguistic considerations" (p. 50). The authors explain that when an arrangement about which kind of CMC to implement to a certain environment is being carried out, it is essential to analyse the particular context of the learner, his or her viewpoint.

5.4.4 Linguistic dimension

Different forms of computer-mediated communication compromise the linguistic mechanisms that suggest a convenience in respect with language acquisition efficiency. Asynchronous and synchronous modalities for establishing learning-oriented communication making use of technologies comprehend certain differences about the quantity and quality of language that is brought forth through them. According to the authors' findings, synchronous CMC seems to share several features of oral discourse, whereas asynchronous CMC embodies a context comparable to written forms of language.

5.4.5 Material dimension

A material dimension is reckoned by the authors, through which physical aspects of the technological resources available to what educational projects concerns. These aspects are taken into consideration by the authors in a designing criteria plane, because of the way they are said to "shape" the communication that takes place in a learning context, aspects such as: physical properties of the technological devices employed for learning purposes (size, weight, portability, price), range of interactive modes available with the article, and so on.

6 METHODOLOGY

The present project has been developed taking into account three main phases. These phases are presented in light of well accepted precepts about educational design approaches in language teaching. The first phase of the design work is an ethnographic course of action that aims at framing the target population this entire work will be focusing its efforts on, that is to say, this phase will consist on a description of the procedure for characterizing the groups of people that are being targeted here as learners. With this, the data that is expected to be surveyed is related to demographic, professional, and specific academic aspects of the individuals that were evaluated. This data is retrieved making use of informal interviews and semi-structured surveys.

Secondly, there was a formal designing phase in which, according to the information surveyed in the needs analysis section, a whole didactic sequence was detailed. This didactic sequence is composed of a series of lessons, each one of them composed at the same time by several activities, exercises and workshops.

Finally, an evaluation of the design proposed in this work will be described. This evaluation was carried out by specialists in ESP field and it will yield important considerations regarding the different aspects involved with the pedagogical implications of the project.

6.1 NEEDS ANALYSIS

6.1.1 Target Situation and Needs Analysis

Hutchinson and Waters (1987) explain that although a stage they label *Target situation analysis* did not produce direct strong changes in ESP approaches, it served later to determine what makes ESP different from general English.

Different needs can be specified of language learning but those needs are not commonly specified in the general English class. Hutchinson and Waters (1987) argue that ESP not only recognizes the existence of such needs nor has an awareness of them. They describe two kinds of needs that may be analyzed in the course design process. Those are, the *Target needs* (necessities, lacks and wants) “what the learner needs to do

in the target situation”, and the *learning need*- “what the learner needs to do in order to learn”.

Hutchinson and Waters (1987) outline a brief review on the issues are expected to be taken into account when a course designer is aiming at a planning an ESP project:

6.1.1.1 Target Situation Analysis Framework

1. Why is the language need?

1. For study.
2. For work.
3. For training.
4. For a combination of the previous ones.
5. For some other purpose, e.g. status, examination, promotion.

2. How will the language be used?

1. Medium: speaking, writing, reading, etc.
2. Channel: telephone, face to face.
3. Types of text or discourse: e.g. academic texts, lectures, informal, conversations, technical manuals, catalogues.

3. What will the content areas be?

1. Subjects: e.g. medicine, biology, architecture, shipping, commerce, engineering.
2. Level: e.g. technician, craftsman, postgraduate, secondary school.

4. Who will the learner use the language with?

1. Native speakers or non-native.
2. Level of knowledge of receiver: e.g. expert, layman, student.
3. Relationship: e.g. colleague, teacher, customer, superior, subordinate.
5. Where will the language be used?

4. Physical setting: e.g. office, lecture, theatre, hotel, workshop, library.
5. Human context: e.g. alone, meetings, demonstrations, on telephone.
6. Linguistic context: e.g. in own country, abroad.

6. When will the language be used?

1. Concurrently with the ESO course or subsequently.
2. Frequently, seldom, in small amount, in large chunks.

Learning needs: Hutchinson and Waters (1987) describe a secondary type of need, “learning needs”, these are arranged in accordance with the following question: “What knowledge and abilities will the learners require in order to be able to perform to the required degree of competence in the target situation?”

6.1.1.2 Framework for Analyzing Learning Needs:

1. Why are the learners taking the course?

1. Compulsory or optional
2. Apparent need or not
3. Are status, money, promotion involved?
4. What do learners think they will achieve?
5. What is their attitude towards the ESP course? Do they want to improve their English or do they resent the time they have to spend on it?

2. How do the learners learn?

1. What is the learning background?
2. What is their concept of teaching and learning?
3. What methodology will appeal to them?
4. What sort of techniques is likely to bore/alienate them?

3. What resources are available?

1. Number and professional competence of teachers?
2. Attitude of teachers to ESP.
3. Teacher's knowledge of and attitude to the subject content.
4. Materials.
5. Aids.
6. Opportunities for out-of-class activities.

4. Who are the learners?

1. Age, sex, nationality.
2. What do they know already about English?
3. What subject knowledge do they have?
4. What are their interests?
5. What is their socio-cultural background?
6. What teaching styles are they used to?
7. What is their attitude to English or to the cultures of the English-speaking world?

5. Where will the ESP course take place?

1. Are the surroundings pleasant, dull, noisy, cold, etc?

6. When will the ESP course take place?

1. Time of day.
2. Every day / once a week.
3. Full-time / part-time
4. Concurrent with need or pre-need.

6.1.2 Identifying the Nature of the Learner's Needs

According to Mackay and Mountford's comments (1978) on identification of the nature of the learner's needs express that informal approaches to the target group's needs usually leads to erroneous outcomes. The authors explained this fact as a result of a lack of rigueur in terminology usage by the majority of non-linguistically trained language users. Language users do not conceive a fair amount of linguistic resources from which a certain task or role might be performed, this, based on the authors' precisions, does not contribute to a realistic and objective need analysis' outcome. It is on the teacher or course designer where the responsibility of addressing a consistent analysis is placed at, and in view of the above, the authors propose two formal ways for gathering information as part of a needs analysis, a questionnaire to be filled out by the teacher or the learners or by means of a structured interview.

Mackay and Mountford's work (1978) illustrates a very consistent prototype interview with which a careful analysis is carried out in national autonomous university of Mexico by the research and Development Unit so as to design a special purpose English Language course for undergraduates in a faculty of Veterinary Medicine. The interviews are administered to the teaching staff of the faculty and to the undergraduates. The professor's interview is structured in this way:

The interview starts with name of the faculty, subject they taught, own name, the subject, what percentage of required reading was in fact available in Spanish. Questions number two, three and four looked forward to determine the necessity or familiarity with the foreign language the teacher and students were supposed to possess in order to pass a subject or to graduate in that specific field. Question number five aimed at determining in which foreign language the professor to prepare his classes. Question number seven intended to precise the nature of the material suggested to the students, either textbooks, scientific papers, journals, etc., which hence, would provide the course designer with important data about the style, lexis, etc. students were particularly exposed to. Last question, question number eight, asked the professor about his opinion on the usefulness of English for the students to graduate as competent professionals.

6.1.3 Interview

The ethnographic work proposed for the needs analysis research required for this work began with a series of semi-informal interviews carried out with life sciences teachers of the Universidad del Valle during the first semester 2013. The interviews were thought as a strategy to take a view of the generalities of the community involved with the programs that were being intended to be analyzed for the purpose of the design. The interviews were semi-structured since these were not limited by a specific set of questions but rather they were open for the purpose of a more fluid conversation with the interlocutor. During the interviews I asked the teachers about the curriculum status of the life sciences programs they belonged to, the role English as a foreign language had for the undergraduate students they taught to, the difficulties that the students used to exhibit in their particular academic field in relation to the foreign language competence, etc. The teachers shared a lot of information about their specific academic contexts and the particular roles English has been taking into them.

6.1.4 Survey

In accordance to the information collected through the interviews a second needs analysis tool was structured, a survey (Appendix A). The survey made use of the general facts that were revised during the interviewing process in order to create a more context-framed evaluative tool that may yield more detailed information about the target population that was being approached. The survey was structured trying to focus on the specific aspects that concerned the life sciences teachers, that is to say, their perceptions regarding the conditions of the students as performers of English as a foreign language in a specific academic world. Ten life sciences teachers answered the questionnaire during the first semester 2013.

6.2 APPROACHES TO ESP COURSE DESIGN

Hutchinson and Waters (1987) define course design as the process by which the data about a specific learning need is explained so as to generate series-of-teaching-learning experiences, whose ulterior purpose is conducting learners to a specific phase of

knowledge. This comprehends the usage of empirical and theoretical data available to create a syllabus, thus, to establish a methodology to teach specific materials and for developing testing procedures whose progresses in accordance with certain goal may be evaluated.

Three main different approaches to English for Specific Purposes Course Design are suggested by Hutchinson and Waters, as following: language-centred approach, skill-centred approach and learning-centred approach (see Tables 1, 2 and 3).

6.2.1 Language-Centred Approach to Course Design

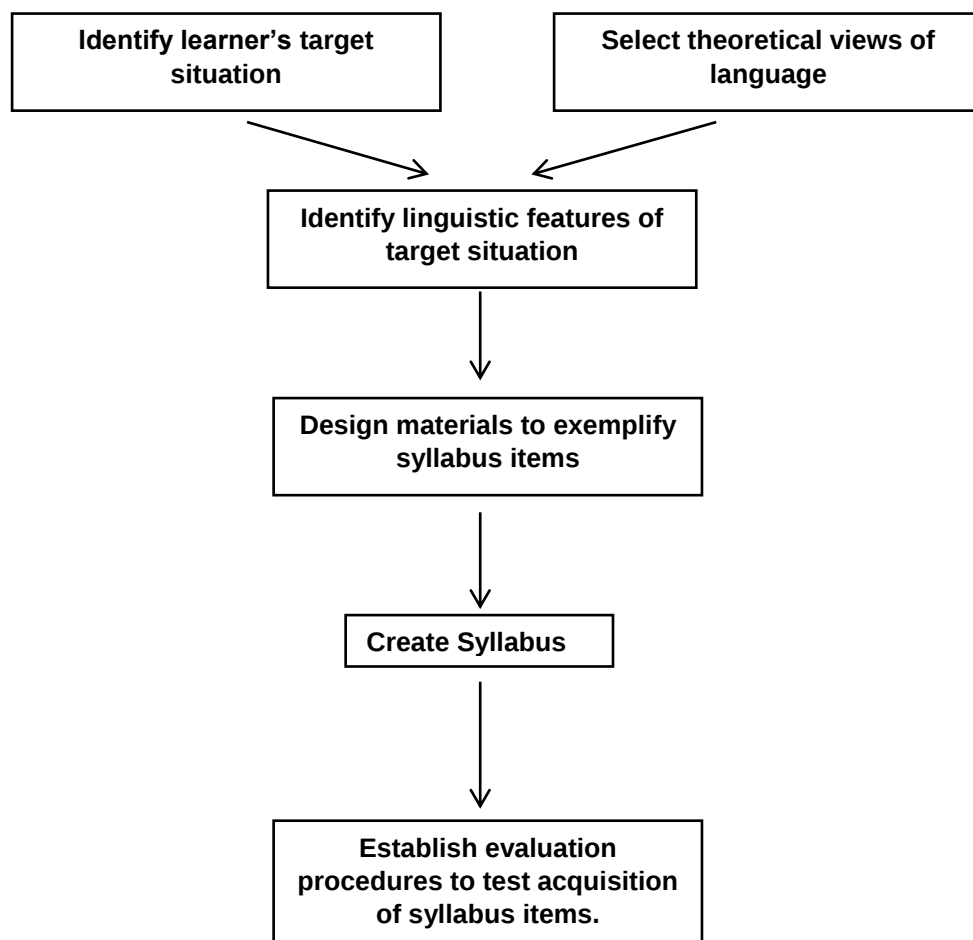
Language-centred approach to course design processes attempts to establish a narrow interaction between analysis of target situations and the ESP contents of a course. Though this approach is deemed to be departing from the learner and its needs, the learner is, as a matter of fact, solely a means for distinguishing the target situation itself, the learner is addressed so as to identify a restricted area of language contents that represent a direct and merely functional medium through which a particular linguistic performance might be carried out, learner does not become a part of this process as such. The whole approach is in such a way not learner-centred but learner-restricted according to Hutchinson and Waters' examination.

Moreover, according to Hutchinson and Water's (1987) course design remarks, language-centred processes are also judged for comprehending rather inflexible procedures which leave aside the possibility of embracing into the designing process the variabilities human groups are subjected to. In this sense what is questioned by the authors is the difficulties related to the likely erroneous and out-of-perspective assumptions a course designer might tend to replicate when his or her procedures during designing stages are lacking of flexibility.

Language-centred approach operates as what it seems to be a systematic model which itself leads to a misleading presumption, the one of learning being systematic as well. This regard encloses a preposterous disposition that aims at language learning in a systematic manner, this as a consequence of a systematic needs analysis and language data presentation. Though there is definitely a structuration immersed during all learning process, this systematizing tendency is produced innerly by the learner, this is not imposed by external factors.

Another point addressed by Hutchinson and Waters (1987) in reference with the disadvantages of the Language-centred approach is the predictive inclination of the model based on its analytical features. This comprises a difficulty in terms of generating an illusory hypothesis about the disposition of the target group in connection with its needs, that is to say, for instance, syllabi and materials are adjusted in accordance with an analytical perspective of its particular language needs, which, consequently, excludes learning factors that are implicit in the process of language acquisition and which are not strictly linked to the linguistic necessities associated to the target situation study. The whole approach points at reaching a language user that, hypothetically, do not respond to any other inquisitional factors than the ones comprehended in a frame of systematized chunks of language.

Table 1: Language-centred approach to course design (Hutchinson and Waters, 1987, p. 66)



6.2.2 Skills-centred approach to course design

Skills-centred approach has been widely implemented especially in Latin America settings in which, for several factors, there is a persistence of particular needs towards the access to knowledge domains through specific skills. This imperative tendency is embraced by the acknowledgement, for instance, of socio-economical characteristics of target populations in which resides a prioritization of skill usage so as to fulfill specific gaps. For example, there is a regular need of reading in English learning considering the lack of specialized academic texts in the mother language. According to the authors, the Skills-centred approach is based on two prime principles, as follows:

Beneath any language behavior resides a scale of skills and strategies that are employed by the language user to get involved in discursive situations. A Skills-centred approach looks forward to reach the underpinning competences underlying any language performance.

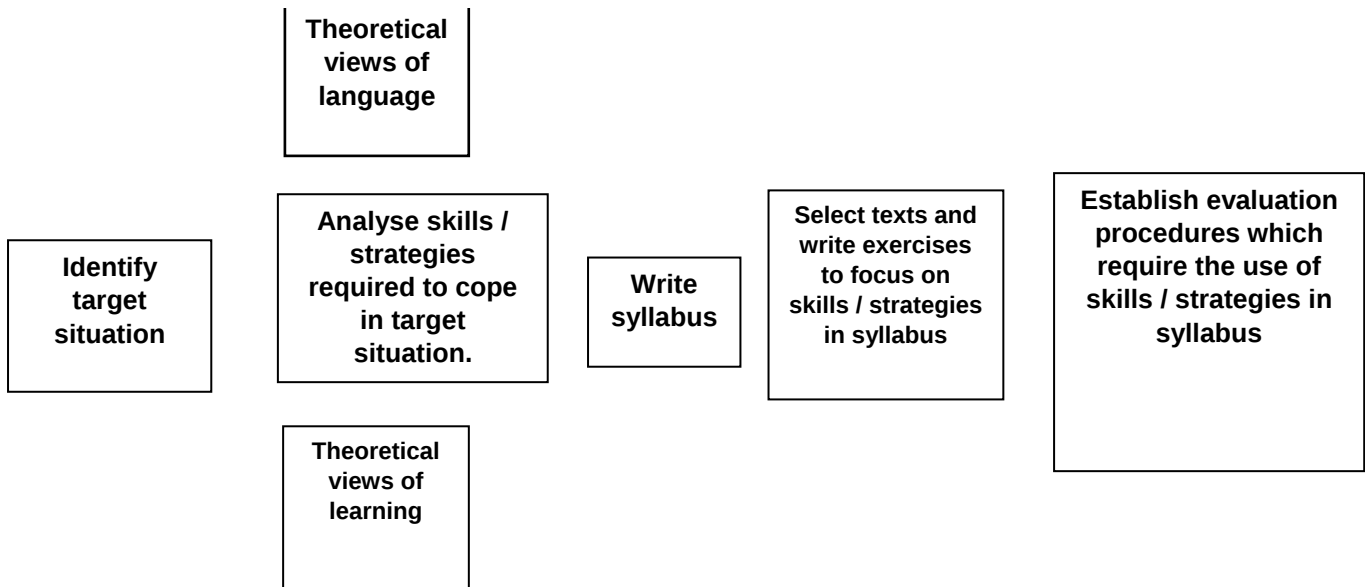
Skill-centred approaches are contrived based on a pragmatic basis that distinguishes two types of courses, goal-oriented and process-oriented courses. From a process-oriented perspective course design is understood as an effort to ignore the obviated and traditional trend in ESP to proceed in course development aiming specific objectives; this is, to conduct the students' endeavors to reach particular and standardized goals. Aims that objectively, would leave aside in the majority of cases the disposition the target group would carry with them in terms of linguistic and pragmatic resources since the beginning of their learning process.

Skills-centred approach is not conceived, according to the authors' observations, as a means to provide student with specific linguistic knowledge but as a strategy to make learners more efficient processors of information. Thus, in accordance to the above, needs analysis comprises a role that stands estimated from two key points: needs analysis yields the data for determining the core abilities that are behind a subject's performance in a specific target situation, secondly, needs analysis encourages the designer to detect and recognize the capacities learners come with to the ESP classroom.

The previous formulations remark an important estimation of learner in the process of construction of the course project, however, the approach does not achieve to get rid of the premise that places language learner as a user rather than a language apprentice,

this is, there is a complainant concerning about the revision of processes involving language use, the foregoing discounting the incidental factor underlying language learning itself.

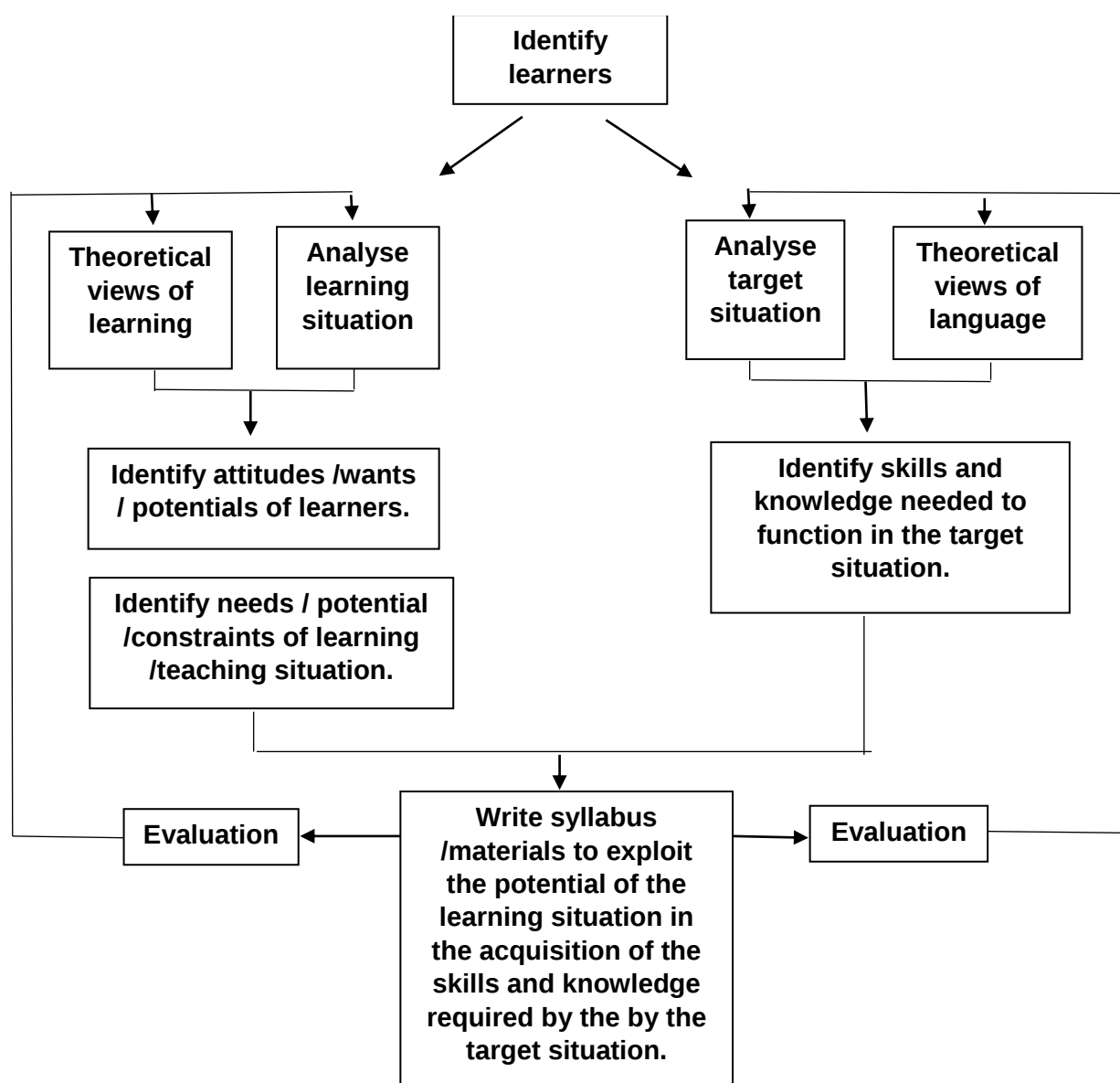
Table 2: Skill-centred approach to course design method. (Hutchinson and Waters, 1987, p. 71)



6.2.3 Learning-centred approach

Learning-centred approach is easily described as a proposal that examines the performance of the student looking forward to improve with more attention of the processes the student undergo to actually embrace specific knowledge, that is to say, how the student learns instead of focusing the attention on the competences the students are usually expected to acquire to cope with the target situation. Course design is thought as a negotiated and dynamic process according to Hutchinson and Waters' observations, as following:

Table 3: Learning-centred approach to course design. (Hutchinson and Waters, 1987, p. 74)



6.2.4 Implementing a Text-Based Approach (Richards, 2006)

According to Richards (2006) in his work: Communicative Language Teaching, a text-based approach to language teaching is described, in terms of activities and procedures, on the following phases:

Phase 1: Building the Context

1. Context is displayed making use of pictures, excursions, realia, audiovisual materials, guest speakers, etc.
2. Social purposes of the text are set up by reason of discussions, surveys, etc.
3. Cross-cultural activities such as comparing differences in the use of the text in two cultures are implemented.
4. Students contrast the model text with other text of the same type.

Phase 2: Modeling and deconstructing the text

1. Students research about the structural patterns and language features of the model text.
2. Students compare the corpus with other samples of the same typology.

Phase 3: Joint construction of the text

1. Students start to provide information so as to construct significant samples of the model text.
2. Text construction is gradually reduced in terms of group contribution in order to lead the students to elaborate on a textual frame individually.

Phase 4: Independent construction of the text

1. Students work individually on the text construction.
2. Learner performances are taken into consideration

Phase 5: Linking to related texts

1. Students' research on what they have acquired related to text functions and how this is linked to other kinds of texts in a similar context.
2. Students compare the use of the text type in different domains.
3. Students' research on how specific content language employed in the corpus is used in other text types.

6.2.5 Materials Design

A material design model: Hutchinson and Waters (1987) describe a basis framework for designing materials subscribed to a ESP project, this frame consists on four main aspects: input, content focus, language focus and task.

1. **Input:** The input is described by the authors as a group or elements that constitute the whole set of information proposed for the learner to start from so as to construct real meanings in the foreign language.
2. **Content focus:** This aspect represents the entire set of features that elaborate a context-linked meaning from which linguistic aspects of the didactic sequence are articulated.

Based on the needs analysis provided by the students the premise for designing the course was to make it as relevant and useful as possible involving both linguistic and content-based work as complementary elements for this process development. The course design consisted of three stages: planning and selection, implementation and evaluation.

6.3 EVALUATION PROCEDURE

The evaluation procedure of the design product was carried out during the first two weeks of January, 2015 drawing on a survey that was completed by specialized and experienced teachers who have been involved with EAP programs at Universidad del Valle. The survey was applied individually, each teacher took an average of one hour and a half to assess the sequence with the materials. Thus, the whole evaluation procedure took 22 hours, considering the time programmed for each one of the 15 surveyed EAP teachers. The survey was designed implementing a Likert-type scale in which through the scaling method different aspects of the didactic sequence were measured considering scales of positive and negative responses to an evaluating statement.

When you finish revising the didactic sequence and the materials deliver an opinion on the points of each one of the following variables, enclosing into a circle the scale level that displays more accurately your opinion.	TA: In total agreement A: In agreement D: In disagreement TD: In total disagreement DA: It does not apply
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This survey was aimed at evaluating the following components or aspects of the design products and process: Successful development of the objectives, development of motivational factors, nature of the activities, methodology insights and procedures, orientations of the materials and didactic sequence itself, pedagogical considerations in the development of the physical and virtual materials, the and development of the exercises and challenges designed.

The first axis of the sequence to be evaluated was the objectives and it was presented taking into consideration two different aspects:

Objectives	Are well defined or can be easily inferred from the material.
	Are coherent with the educational needs that urge to be looked after.

Next, the survey presents a point that aims at evaluating the motivational factors behind the sequence and materials:

Motivation	Is appropriate to the target population the sequence is addressing.
	Keeps the interest for achieving the objectives with a good efficacy level.

After this, the survey presents an axis that aims at evaluating the activities of each lesson, the way they were presented to stimulate the students' performance during the process:

Activities	The methodology favors the active students' participation on their learning process.
	Demand the students to solve problematic situations.

Subsequently, the survey presented a component on methodology, here the congruence between the theoretical principles established for the project and the design results:

Methodology	Is based on didactics principles that are in accordance to what is aimed to be taught.
	Consistently makes use methodological principles prone to be applied.

After this, the survey demands the teachers to assess the way the sequence and the materials had the students to approach the activities comfortably and offering substantial feedback:

Materials and didactic sequence's reorientation	Is friendly, it is not threatening or aggressive.
	Gives hints, clues or explanations before inviting to solve the problem.
	Allows knowing why the students have failed at certain instance.

Next, the survey proposes an axis for evaluating the presentation of the virtual materials and the contents in it:

Interface Of Virtual Materials	The procedure for using the entering devices is simple for the typical user.
	The way for consulting the available commands is simple.
	There is consistence in the way the answers are asked to the user.
	The speed of messages unfolding is appropriate for the user.
	The size and kind of letters allow and fast and comprehensive reading.
	The graphics and animation enrich what is being learned.
	The vocabulary or terminology is appropriate to the cultural level of the user.

Later, the teachers will be surveyed about the way the physical materials presented, the possibilities of success in the communication between the materials and the students:

Presentation of physical materials	There is consistence in the way the answers are asked to the user.
	The size and kind of letters allow and fast and comprehensive reading.
	The graphics and animation enrich what is being learned.
	The vocabulary or terminology is appropriate to the cultural level of the user.

Finally, the survey presents an axis for the teachers to evaluate the quality of the exercises implied in the activities proposed in the sequence.

Exercises or challenges	Allow to exercise and prove the mastering of each one of the objectives.
	Their format corresponds to the level of the proposed objectives.
	Are varied and enough so as to achieve the mastering

7 NEEDS ANALYSIS RESULTS

The results that are indicated here gather information collected from specific needs analysis tools such as interviews and surveys, however, the results also present data collected from the research I carried out revising curriculum documents, asking minor questions to ESP teachers, checking personally physical environments and so on.

Firstly, regarding the interview process, the type of analysis that was being held in view of the students' needs was still very divided and it left aside several important factors that were strictly linked to the students' professional profiles. Thus, it was decided that the needs analysis process needed to start with interviews to the staff that constituted the backbone of the program to be examined, the teacher. But before going after this point it was crucial to determine which particular program was going to be examined. Given the particular interest of the author of this project the analysis was pointing out to find out the special necessities of students belonging to life sciences programs such as: biology, medicine, bacteriology, etc.

In accordance to these decisions several teachers belonging to these programs were interviewed. The interviews aimed at finding out what these teachers considered to be the priorities of the students in terms of approaching the knowledge they were programmed to get close to, that is to say, which difficulties the students usually tend to display in terms of their relationships with the texts and the kind of languages exhibited in there. Here I summarize some of the most important aspects that were extracted from these interviews:

Undergraduate students seem to present a lot of difficulties dealing with the texts they are given by their teacher during the last semesters of their programs. These difficulties, according to the teachers' views, seem to be related to a lack of proper vocabulary for the students to approach text of specialized language. The teachers seemed to be concerned about the kind of approach that was being held for English teaching at Universidad del Valle, some teachers felt the students are not exposed to enough practice in activities that demand them considerable amounts of oral production. Some other teachers felt the students needed to improve their skills at reading because, according to the teachers' experiences, it is reading the academic activity that most challenges and advantages may represent for the student in the academic world.

Most of the teachers mentioned that the students were constantly demanding from them very specific knowledge in terms of politics, structure and vocabulary. The students were said to be exposed at final semesters to particular textual frames they didn't seem to acknowledge at all.

Subsequently, the needs analysis was proposed in a shape of surveys that aimed at sounding out more concretely what were those specific kinds of genres, contents, skills and terminology the students were more urged about. The needs analysis yielded a particular necessity of designing a program that offered solid basis on the textual genres such as scientific textbooks and scientific articles and the topics that were consolidated as common thematic attention focuses were cell biology and ecology. The previous surveys were applied to twenty teachers belonging to the medicine, biology and bacteriology programs. The information capitalized here was reduced only to the aspects that were considered relevant to this project:

- The kinds of textual genres the students were expected to deal with were science textbooks and scientific articles.
- The topics that, for several reasons, were considered in these three programs necessary to be based on strong terminological basis was cell biology and ecology.
- The skills that are deemed to be the most important for the students according to the activities they are expected to perform is reading and less urgently writing.

8 DESIGN RESULTS

8.1 CONTENTS OF THE DIDACTIC SEQUENCE

Table 4 describes the contents of the didactic sequence in terms of the conceptual frames that were proposed. The table is presented taking into account two different and complementary axes the first one, named “Specific Study Field and Contents”, is a general frame that suggests a pragmatic-semantic reference for learning and teaching academic English (e.g., Cell Biology and Biochemistry). This axis includes the thematic notions of this scientific field that have been specified for the EAP program (e.g., Cell structure and laboratory equipment). Thus, this axis depicts the most important contributions of the needs analysis process regarding the requirements in conceptual and terminological terms.

Table 4: Contents of the Didactic Sequence for an EAP Course

SPECIFIC STUDY FIELD AND CONTENTS		
CELL BIOLOGY AND BIOCHEMISTRY		
Cell structure, physiology and laboratory equipment		
MACROSTRUCTURAL ANALYSIS LEVEL	MICROSTRUCTURAL ANALYSIS LEVEL	
Genre Features	Rhetorical Functions	Grammatical Structures
Textbook 1. Science discourse features 2. The Textbook as a Genre 3. Textbook's Features	Physical Description	1. Verbal structures in physical descriptions 2. Measurement language in physical descriptions 3. Locative adjectives in physical descriptions 4. Prepositional structures in physical descriptions. 5. Shapes in physical descriptions
	Function Description	1. Verbal structures in function descriptions 2. Prepositional structures in function descriptions

A second axis is proposed as a descriptive category for explaining the nature of the analysis proposed in the didactic sequence. The text is approached from a wide perspective, a macrostructural analysis level, where the discourse and textual features are revised; subsequently, a more detailed study of the language within the text, a microstructural analysis level, is carried out. In the macrostructural level a discursive and pragmatic practice is enlisted; for the purpose of this project this approach configures a study in terms of genre features and characteristics. On the other hand, the microstructural level is developed making use of two subcategories of analysis, one related to the rhetorical functions present in the textbook examined and then, another one related to the grammatical features present in each specific rhetorical function which were identified by a thorough scrutiny of the text.

Trimble's work on textual analysis (1985) drawing on rhetorical functions was taken into account for the approach suggested here. The author presents a series of rhetorical functions and grammatical features, each one of them described with detail. According to the nature of each function and to the text samples selected, I extracted the grammatical features that were more recurrent in the textual frames that were being analyzed.

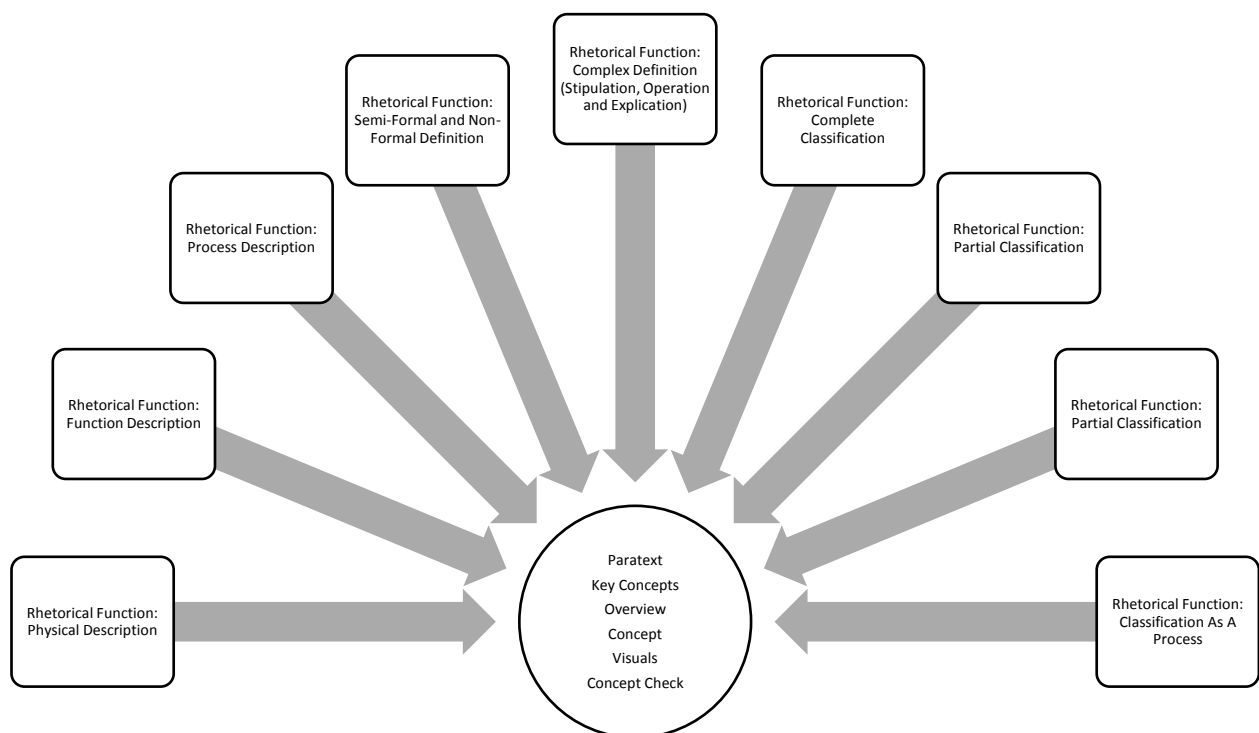


Figure 1: Rhetorical Functions in Textbook analysis.

Figure 1 presents a synthesis of how the discursive approach of this work is proposed in complete correlation with the rhetorical functions figures proposed by Trimble (1985). I worked on the first two of them, physical and function descriptions because of their highly recurrence and relevance in the textbooks of life sciences.

This didactic sequence only deals with some of rhetorical functions and their related grammatical structures. The purpose of this work is basically exhibiting a sample of how the two axes of analysis and their categories shape a designing model that may be used afterwards so as to propose other EAP pedagogical projects.

8.2 DIDACTIC SEQUENCE ORGANIZATION

The didactic sequence was designed drawing on specific rhetorical functions and grammatical structures that are interrelated according to a particular study field and contents. These functions and structures are deemed to be important for an efficient recognition and treatment of science textbooks as textual genre. The sequence is composed of several lessons and each lesson aims at developing the mastering of a specific rhetorical function. Each rhetorical function is examined in the context of the textual genre that is being approached through this proposal (the textbook).

The lessons are a detailed plan in which several activities are described in conjunction with the aids created in support of them. Each activity is described concisely mentioning the time, materials, exercises and virtual and physical aids arranged for the lesson. Some of the physical aids prepared for the lessons consist on workshops that aim at enhancing the mastering of formal structures in a contextualized frame of work into which the contents of specific scientific field (cell biology) are enrolled to offer the students not only an enriching practice chance but also a possibility to expand the student's vocabulary in the specific content field that is being treated. A summary of the contents of the didactic sequence is described and this showcases the lessons, activities and the virtual and physical materials proposed for each lesson. Not every activity is supported by virtual aids; these virtual aids are considered in specific cases in which they were comprehended as a relevant tool for autonomous practice.

Each lesson resolves a series of analysis categories for the study of the textual frame drawing on specific conceptual and terminological considerations, therefore, the textual frames are already conditioned before the beginning of the program by a principle of content relevance. For the purpose of this thesis it was determined from the needs analysis process that cell biology issues were extremely relevant for the training of life sciences undergraduate programs' student.

Each lesson is subordinated to the particularities of the complexity of the rhetorical function there presented, hence, some lessons may take on a bigger expand in terms of time and activities than others. The description of the didactic sequence program is explained in the following chart:

Lessons	Activities	Virtual Workshops:	Physical Workshops
LESSON # 1: Contextualization To Genre And Content issues.	Activity # 1: Contextualization Scheme Activity # 2: About Science Activity # 3: The Textbook As A Genre Activity # 4: Textbook's Features		Workshop # 1: English in Life Sciences Workshop # 2: About Science Workshop # 3: The Science Textbook: Sociodiscursive Dimension Workshop # 4: The Science Textbook – Macrostructural Dimension
LESSON # 2: Physical Description Appropriation Stage	Activity # 1: Formal Physical Description Structure Activity # 2: Dimensions (Measurement units) Activity # 3: Dimension (Locational structures: verbal, adjectival and prepositional structures) Activity # 4: Shapes Activity # 5: Exercising Location Structures	Virtual exercise # 1: Physical descriptions: Verbs for describing directions and positions. Virtual exercise # 2: Physical descriptions: Adjectives Virtual exercise # 3: Physical descriptions: Prepositions	Workshop # 5: Physical Descriptions – Language for measuring Workshop # 6 Physical Description: Locative Adjectives
LESSON # 3: Function Description Appropriation Stage	Activity # 1: Description of Function		Workshop # 7 Function Descriptions: Science Laboratory Equipment

8.2.1 LESSON 1: Contextualization to Genre And Content Issues.

Timing: Three hours

Materials: Video Beam, workshops, board

General objective:

The students will identify the main features of most common textbooks in science fields.

Specific objectives:

1. The students will recognize the discursive implications in the social acts that are represented throughout a textbook as a genre.
2. The students will recognize the basic macrostructure of a science textbook chapter.
3. The students will recognize technical terminology pertinent to Textbook features in life science domains.

Activity 1: Contextualization Scheme

The course is embarked introducing the academic working field the students are subscribed to in virtue of their professional setting and the linguistic necessities associated to it, English for Science and Technology (EST). Initially the teacher will propose a vocabulary warm-up to get the students familiar with the subjects to be treated. The teacher will ask the students which subjects the following words primarily belong to (Biology, Chemistry or Physics)

Cell - Nucleus - Electron - Radio Activity – Energetics - Ideal Gas

The teacher will offer a feedback on the board:

1. Cell - Biology and Physics

2. Nucleus - Biology, Chemistry and Physics
3. Electron - Chemistry and Physics
4. Radio activity - Chemistry and Physics
5. Energetics - Biology and Chemistry
6. Ideal Gas – Chemistry and Physics

The teacher will comment that, as students can see, each scientific field draws on very special language particularities, in this case, particular vocabulary. According to this, the teacher will invite the students to examine which particularities the field the students work on possesses.

The teacher will draft a conceptual diagram on the board with the students allowing them to reach collectively a consensus of what their own study field requires from them in terms of language competences and at the end of the activity the student will receive workshop # 1 summarizing the information gathered by both the teacher and the students. The teacher will depart from the premise that reading has been chosen as a main skill to develop in the course according to the following criteria:

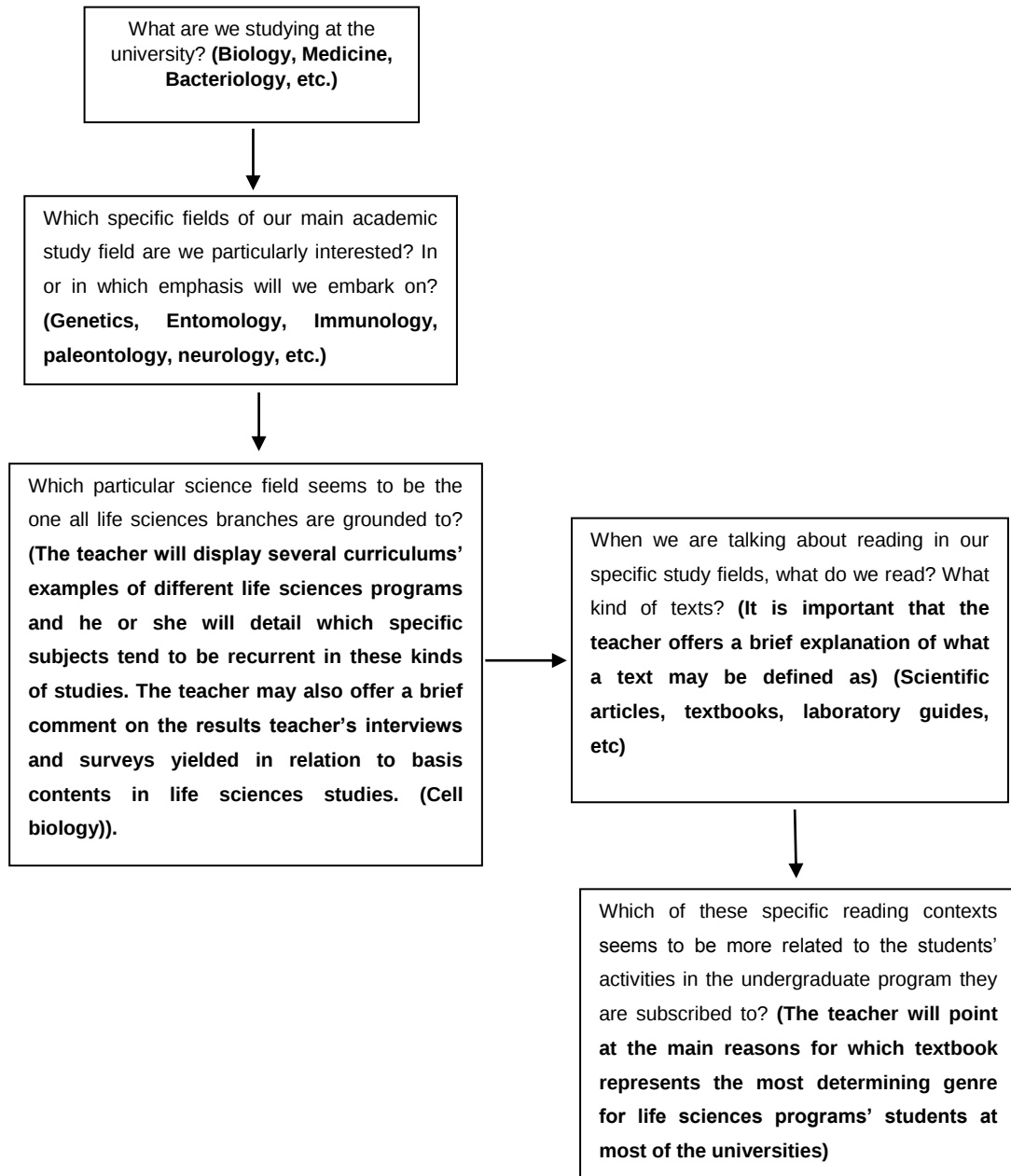
The different communicative challenges that students will face in undergraduate education are subjected to an important performance as a reader (a reader of scientific documents). Challenges such as: dealing with basic theoretical information in their specific study fields, placing themselves in the socio-discursive world they are related to in their professional settings, etc.

The teacher will conduct the student's deductions in reference with the construction of these scheme posing specific questions. The questions will pose particular interrogation structures (W questions) that will be recalled and formalized by the teacher. Those questions will intend to invite the students to place their academic efforts in a more contextualized and meaningful learning environment, as following:

1. What are we studying at the university? (Biology, Medicine, Bacteriology, etc.)

2. Which specific fields of our main academic study field are we particularly interested in or in which emphasis will we embark on? (Genetics, Entomology, Immunology, Paleontology, Neurology, etc.)
3. Which particular science field seems to be the one all life sciences branches are grounded to? (The teacher will display several curriculums' examples of different life sciences programs and he or she will detail which specific subjects tend to be recurrent in these kinds of studies (Cell biology)).
4. When we are talking about reading in our specific study fields what do we read? What kind of texts? (What is a text?) (Scientific articles, textbooks, laboratory guides, etc)
5. Which of these specific reading contexts seem to be more related to the students' activities in the undergraduate program they are subscribed to? (The teacher will point at the main reasons for which textbook represent the most determining genre for life sciences programs' students at most of the universities)

A scheme like the one presented as following may be a significant output to aim at from the previous questions (the teacher may provide students with a paper sheet summarizing this scheme, workshop # 1) and students may answer the questions in it:



Activity 2: About Science

The teacher will explore with students basic notions about general sciences and he will establish several comparisons between life science notions and study presumptions of other fields. The exercise will also be important for having the students to recall important aspects about English words that may turn out to be false cognates in relation to the Spanish equivalents. The teacher will ask the students to share some of his answers to assess in which moment their language skills in English are going through.

The teacher will give students workshop # 2 and he will invite the students to resolve the exercise proposed by the workshop collectively while exploring the notions mentioned above. First of all, the teacher will invite the students to recognize the main distinction between Science and a science, and scientific and scientist. The students will carry out the exercise related to it and they will continue to an open answer exercise in which they will be able to express what their thoughts are on science and its purpose. The teacher will ask the students to appeal to a reasoning based on a perspective of social responsibility in order to lead a posterior discussion based on this point and related to notions of ethics in science work field.

The teacher will try to recover from the students notions on general sciences in order to provide them with a richer input in reference with academic work and language issues around it. For that purpose the teacher will ask the students which branches we could find in science as a whole. The teacher may explore with the students the definition of main sciences branches such as: natural sciences, formal sciences, social sciences and applied sciences. He will clarify the main distinctions among these branches exploring their conceptual boundaries in terms of study focuses with the students. The teacher may ask the students several examples of sciences for each branch and write them down on the board. Each study field mentioned should be associated with the term for referring to the professional involved with that area, for example: economics with economist.

Once the students complete the previous exercise they will continue with the following point which consists on a set of different words, each of them study objects of different sciences. The students will conjoin each study object with the particular branch of science it is related to, the teacher may propose the students to carry out the exercise

taking into account a classification strategy, students may opt for thinking about the most general science field they can classify that element in and from then on start considering the divergent branch that may be more specifically framing for that study object.

From the point B until F the students will be asked to recuperate the information presented previously about sciences branches, once the students finish these points the results will be shared collectively in order each student may be able to revise if the information contrived in its work it is pertinent.

Activity 3: *The Textbook as an Genre*

Having contextualized the group in respect with the ideas that will direct the course program, it will be established that the textbook will be the specific textual genre that will be treated throughout the course of the semester. In the same way, the teacher will emphasize in a special content to be approached according to the arguments above, Cell Biology.

In this manner, the teacher will introduce general aspects on the Textbook. It will be roughly evaluated taking into account the following dimensions of this genre:

Socio-discursive dimension: Who writes the document? What makes him or her an authority in the field? That is to say, what is his or her profession? What is his or her academic training? Which institution promotes the development of this textbook? Which characteristics should the reader entail so as to access this document successfully? That is to say, who is the text addressing? What specific social groups does the addressed reader belong to? What kind of information is gathered in textbooks (science textbooks)? How is this information presented?

The teacher will explore these questions with the students in order to have them familiarize with the reading context they will get in touch with. The students will be shown two general biology textbooks in the video beam and the teacher will try to examine the first sections of the documents in order to respond the previous questions. The teacher will give the students workshop # 3 in which the previous socio-discursive analysis will be illustrated.

Conclusively, the teacher will make a special emphasis on the last question: How is this information presented? The teacher will explain in which way the understanding of how this information is presented is an extremely valuable tool for the reader to deal with the text. For this purpose, the teacher will introduce the structural dimension of the text.

Structural dimension: The teacher will share with the students the major features of general science textbooks. The teacher will exemplify it with two science textbook's examples from which he will explain the major characteristics in common through the video beam. The examples will contain the different sections in common labeled with the traits that relate that specific feature from both examples.

Activity 4: Textbook's Features

Textbooks share common characteristics, with this; foreign language reader should acknowledge that possessing certain notions of how the text is structured will facilitate a better comprehension. Textbooks display a particular configuration that intends to generate a more efficient conceptualization of formal scientific knowledge and in this sense; textbooks take into account significant precepts on cognitive processes for as the text display facts in a way these result as effectively grasped as possible. Most of the textbooks contain (In both examples the teacher will point at the fragments of text that share these traits so as to relate their common features):

- 1. Classifying titles:** The reader is expected to directly establish an anticipation in reference with the content of the text. What can the reader predict? Titles in textbooks usually aim at establishing categorizations and defining subsets of information from which the reader can elaborate hierarchical and clear assortments of knowledge.
- 2. Headings:** Heading aims at helping the reader to recognize the basic conceptual scheme through which the book is presenting a specific type of knowledge.

3. **Introduction:** Textbook introductions often present a main paragraph that intends to describe the central project of the particular section of the chapter. The above by means of either a key terms' plan or a formal paragraph exhibiting the scheme of the book or section.
4. **Visuals:** Textbooks are composed of an important amount of visual aids that are treated as pedagogical tools for the reader to envisage a richer understanding of what the book is exposing. Such aids encompass tool as: Diagrams, timelines, charts, maps, captions, etc. Typography in textbooks is also manipulated in a way this highlights specific aspects to be crucially considered by the reader.
5. **Conclusions:** Conclusions are usually presented in each textbook's chapters as a summary of questions or statements that aim at recuperating the most important concepts of the section.
6. **Additional informational tools:** Textbooks draw on common informational tools that provide the readers with supplementary data on the topics. Tools such as: Tables of contents, glossaries, indexes, interviews, etc.

Consequently, the students will receive workshop # 4 with some sections of the main corpus selected by the teacher. Each section will have to be labeled by the students, they will examine the sections and they will determine which textbook feature seems to be configured by this fragment. Once the students have undergone this identification activity the students will be introduced to the analysis of formal textbook chapters.

The teacher will explain how science textbooks tend to be developed nowadays in relation to the assembly of their chapters and it will be proposed to analyze the following aspects of textbook chapters:

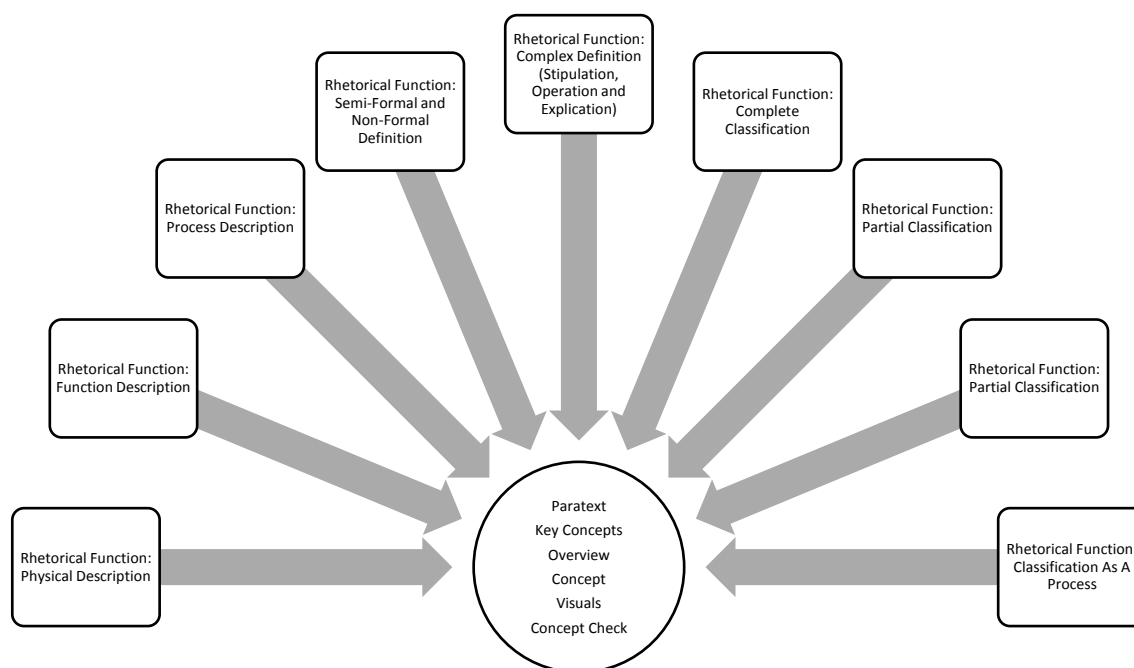
1. Paratext
2. Key Concepts
3. Overview
4. Concept
5. Visuals

6. Concept Check

In order to deal with the previous sections of the selected textual genre and have the students to get familiar with its structure, the teacher will explore each of the textbook chapter' sections from a structural and rhetorical perspective. The teacher will embark on the work on these rhetorical and grammatical structures with which he or she will start drawing on different sections of the chapters depending on how recurrent seems to be this structure in the particular sections:

Textual study levels:

1. General identification of the macrostructure of the selected textual genre

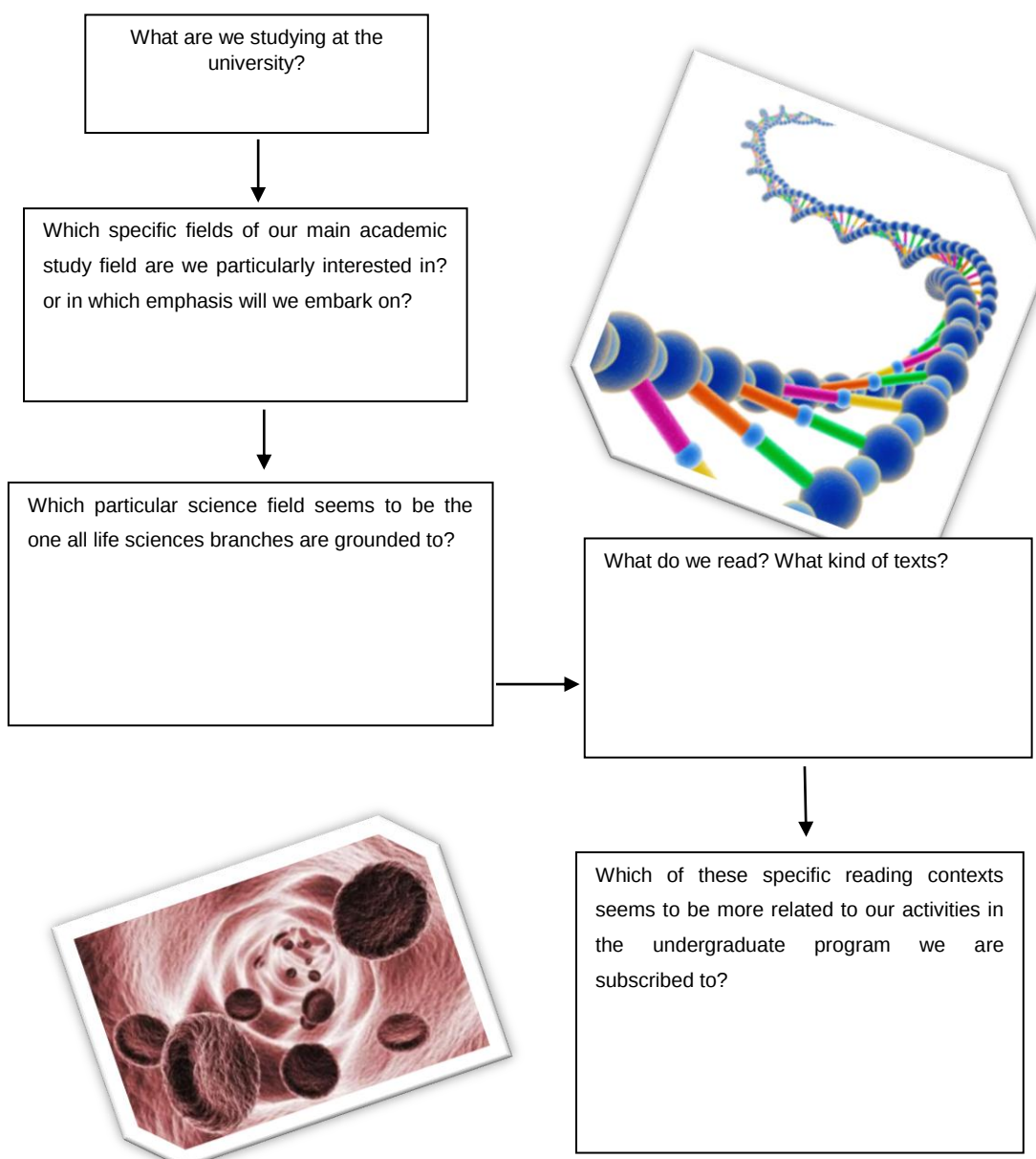


Workshop # 1



Universidad del Valle
Facultad de Humanidades
Escuela de Ciencias del lenguaje
Lectura de Textos Académicos en Inglés II
Prof. Juan David Martinez Caballero
Workshop # 1
English in Life Sciences

Complete the following scheme according to your study particularities:



Workshop # 2



What is Science?

What do the following words mean? Match them with their definitions

Science - A science - Scientific - Scientist

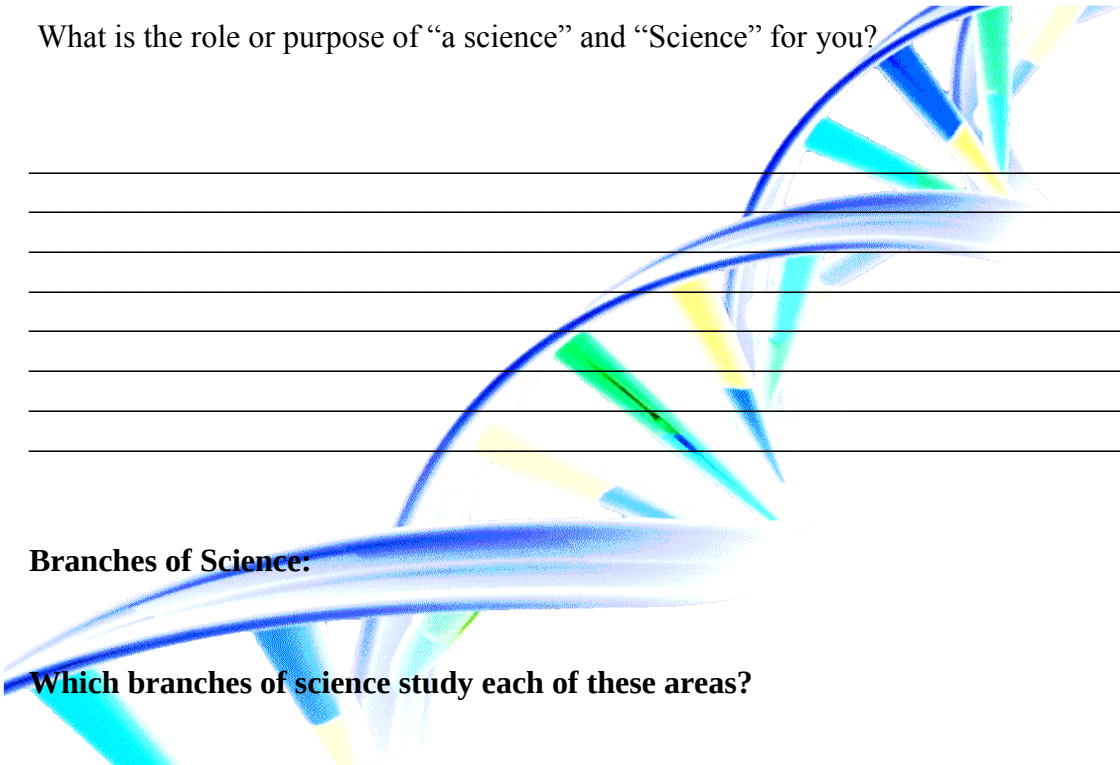
The study of the nature and behavior of natural things and the knowledge obtained about them: _____

A particular area of scientific knowledge and study, or the study of an area of a human behavior: _____

It describes things that relate to science: _____

Someone who works in science: _____

What is the role or purpose of “a science” and “Science” for you?



Branches of Science:

Which branches of science study each of these areas?

Environment: _____

Human mind and behavior: _____

Language: _____

Substances and their reactions: _____

Weather: _____

Political systems: _____

Living things: _____

Matter and forces: _____

Money, industry and trade: _____

Numbers, quantities and shapes: _____

Celestial objects: _____

People, society and culture: _____

Water: _____

Rocks and soil: _____

Society and social behavior: _____

What is the difference between economy and economics, physical science and physics?

How can life sciences be further subdivided?



What is the main difference between sciences and humanities?

Where would you place history, literature, theology and philosophy?

How do we call the scientists who specialize in the following fields of study? How are the names formed?

Ecology:_____

Anthropology:_____

Psychology:_____

Chemistry:_____

Linguistics:_____

Meteorology:_____

Biology:_____

Sociology:_____

Physics:_____

Political Science:_____

Economy:_____

Mathematics:_____

Astronomy:_____

History:_____

Philosophy:_____

Theology:_____



Workshop # 3



Universidad del Valle
Facultad de Humanidades
Escuela de Ciencias del lenguaje
Lectura de Textos Académicos en Inglés II
Prof. Juan David Martínez Caballero
Workshop # 3
The Science Textbook – Sociodiscursive Dimension

In order to understand what science textbooks are presenting us, let's check the examples and solve the following questions:

Textbook # 1: Biology – 8th Edition – MCGRAW HILL, 2012.

Who writes the document?

What makes him or her an authority in the field?

What is his or her academic training?

Which institution promotes the development of this textbook?

Which characteristics should the reader entail so as to access this document successfully?

What specific social groups does the addressed reader belong to? What kind of information is gathered in textbooks (science textbooks)?

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About the Authors

Neil A. Campbell



Neil Campbell combined the investigative nature of a research scientist with the soul of an experienced and caring teacher. He earned his M.A. in Zoology from UCLA and his Ph.D. in Plant Biology from the University of California, Riverside, where he received the Distinguished Alumnus Award in 2001. Neil published numerous research articles on desert and coastal plants and how the sensitive plant (*Mimosa*) and other legumes move their leaves. His 30 years of teaching in diverse environments included general biology courses at Cornell University, Pomona College, and San Bernardino Valley College, where he received the college's first Outstanding Professor Award in 1986. Neil was a visiting scholar in the Department of Botany and Plant Sciences at the University of California, Riverside. In addition to his authorship of this book, he coauthored *Biology: Concepts & Connections* and *Essential Biology* with Jane Reece. Neil died shortly after the initial planning of this revision, but his legacy continues in *BIOLOGY*, Eighth Edition.

Jane B. Reece



Lead author Jane Reece, Neil Campbell's longtime collaborator, has participated in every edition of *BIOLOGY*—first as an editor and contributor, then as an author. Her education includes an A.B. in Biology from Harvard University, an M.S. in Microbiology from Rutgers University, and a Ph.D. in Bacteriology from the University of California, Berkeley. Before migrating to California from the Northeast, she taught biology at Middlesex County College and Queensborough Community College. At UC Berkeley, and later as a postdoctoral fellow in genetics at Stanford University, her research focused on genetic recombination in bacteria. Besides her work on *BIOLOGY*, she has been a coauthor on *Biology: Concepts & Connections*, *Essential Biology*, and *The World of the Cell*.



For the Eighth Edition, Jane Reece is joined by five coauthors whose contributions reflect their biological expertise as scientific researchers and their teaching sensibilities gained from years of experience as instructors.

Lisa A. Urry



Units 1–3 (Chapters 2–21) and Chapter 47

Lisa Urry is a professor at Mills College in Oakland, California, and was a major contributor to the Seventh Edition of *BIOLOGY*. After graduating from Tufts University with a double major in Biology and French, Lisa completed her Ph.D. in Molecular and Developmental Biology at MIT. Following postdoctoral appointments at Harvard Medical School, Tufts University, and UC Berkeley, she began teaching at Mills College, where she currently holds the Letts-Villard Professorship and serves as Chair of the Biology Department. She has published research articles on various topics involving gene expression during embryonic development. Her current research interest is in sea urchin development. Lisa is also deeply committed to promoting opportunities for women in science education and research.

Science Textbook # 2: Concepts in Biology – 14th Edition – MCGRAW HILL, 2012.

Who writes the document?

What makes him or her an authority in the field?

What is his or her academic training?

Which institution promotes the development of this textbook?

Which characteristics should the reader entail so as to access this document successfully?

What specific social groups does the addressed reader belong to? What kind of information is gathered in textbooks (science textbooks)?

Science Textbook # 2: Concepts in Biology – 14th Edition – MCGRAW HILL, 2012.

CONCEPTS IN BIOLOGY, FOURTEENTH EDITION

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Meet the Authors

Eldon D. Enger (Center)

Eldon D. Enger is a professor emeritus of biology at Delta College, a community college near Saginaw, Michigan. He received his B.A. and M.S. degrees from the University of Michigan. Professor Enger has over 30 years of teaching experience, during which he taught biology, zoology, environmental science, and several other courses, and he was very active in curriculum and course development. Professor Enger is an advocate for variety in teaching methodology. He feels that if students are provided with varied experiences, they are more likely to learn. In addition to the standard textbook assignments, lectures, and laboratory activities, his classes were likely to include writing assignments, student presentation of lecture material, debates by students on controversial issues, field experiences, individual student projects, and discussions of local examples and relevant current events.

Professor Enger has been a Fulbright Exchange Teacher to Australia and Scotland, and he received the Bergstein Award for Teaching Excellence and the Scholarly Achievement Award from Delta College.

Professor Enger is married, has two sons, and enjoys a variety of outdoor pursuits, such as cross-country skiing, hiking, hunting, fishing, camping, and gardening. Other interests include reading a wide variety of periodicals, beekeeping, singing in a church choir, and preserving garden produce.

Frederick C. Ross (Right)

Fred Ross is a professor emeritus of biology at Delta College, a community college near Saginaw, Michigan. He received his B.S. and M.S. from Wayne State University, Detroit, Michigan, and has attended several other universities and institutions. Professor Ross has over 30 years of teaching experience, including junior and senior high school. He has been very active in curriculum development and has developed the courses "Infection Control and Microbiology" and "AIDS and Infectious Diseases," a PBS ScienceLine course. He has also been actively involved in the National Task Force of Two Year College Biologists (American Institute of Biological Sciences); N.S.F. College Science Improvement Program (COSIP); Evaluator for Science and Engineering Fairs; Michigan Community College Biologists (MCCB); Judge for the Michigan Science Olympiad and the Science Bowl; and a member of the Topic Outlines in Introductory Microbiology Study Group of the American Society for Microbiology.



Professor Ross involved his students in a variety of learning techniques and was a prime advocate of writing-to-learn. Besides writing, his students were typically engaged in active learning techniques, including use of inquiry based learning, the Internet, e-mail communications, field experiences, classroom presentation, and lab work. The goal of his classroom presentations was to actively engage the minds of his students in understanding the material, not just memorization of "scientific facts."

David B. Bailey (Left)

David B. Bailey is an associate professor of biology at Delta College, a community college near Saginaw, Michigan. He received his B.A. from Hiram College, Hiram, Ohio, and his Ph.D. from Case Western Reserve University in Cleveland, Ohio. Dr. Bailey has been teaching in classrooms and labs for 10 years in both community colleges and 4-year institutions. He has taught general biology, introductory zoology, cell biology, molecular biology, biotechnology, genetics, and microbiology. Dr. Bailey is currently directing Delta's General Education Program.

Dr. Bailey strives to emphasize critical thinking skills so that students can learn from each other. Practicing the scientific method and participating in discussions of literature, religion, and movies, students are able to learn how to practice appropriate use of different critical thinking styles. Comparing different methods of critical thinking for each of these areas, students develop a much more rounded perspective on their world.

Dr. Bailey's community involvement includes participating with the Michigan Science Olympiad. In his spare time, he enjoys camping, swimming, beekeeping, and wine-making.



Workshop # 4



Universidad del Valle
Facultad de Humanidades
Escuela de Ciencias del lenguaje
Lectura de Textos Académicos en Inglés II
Prof. Juan David Martinez Caballero
Workshop # 4
The Science Textbook – Macrostructural Dimension

Science textbook are usually presented exhibiting the following sections and characteristics:

Classifying titles: The reader is expected to directly establish an anticipation in reference with the content of the text. What can the reader predict? Titles in textbooks usually aim at establishing categorizations and defining subsets of information from which the reader can elaborate hierarchical and clear assortments of knowledge.

Headings: Heading aims at helping the reader to recognize the basic conceptual scheme through which the book is presenting a specific type of knowledge.

Introduction: Textbook introductions often present a main paragraph that intends to describe the central project of the particular section of the chapter. The above by means of either a key terms' plan or a formal paragraph exhibiting the scheme of the book or section.

Visuals: Textbooks are composed of an important amount of visual aids that are treated as pedagogical tools for the reader to envisage a richer understanding of what the book is exposing. Such aids encompass tool as: Diagrams, timelines, charts, maps, captions, etc. Typography in textbooks is also manipulated in a way this highlights specific aspects to be crucially considered by the reader.

Conclusions: Conclusions are usually presented in each textbook's chapters as a summary of questions or statements that aim at recuperating the most important concepts of the section.

Additional informational tools: Textbooks draw on common informational tools that provide the readers with supplementary data on the topics. Tools such as: Tables of contents, glossaries, indexes, interviews, etc.

Label the following sections with their respective names:

1.

UNIT ONE The Chemistry of Life

- 2 The Chemical Context of Life 30
- 3 Water and the Fitness of the Environment 46
- 4 Carbon and the Molecular Diversity of Life 58
- 5 The Structure and Function of Large Biological Molecules 68

UNIT TWO The Cell

- 6 A Tour of the Cell 94
- 7 Membrane Structure and Function 125
- 8 An Introduction to Metabolism 142
- 9 Cellular Respiration: Harvesting Chemical Energy 162
- 10 Photosynthesis 185
- 11 Cell Communication 206
- 12 The Cell Cycle 228

UNIT FIVE The Evolutionary History of Biological Diversity

- 26 Phylogeny and the Tree of Life 536
- 27 Bacteria and Archaea 556
- 28 Protists 575
- 29 Plant Diversity I: How Plants Colonized Land 600
- 30 Plant Diversity II: The Evolution of Seed Plants 618
- 31 Fungi 636
- 32 An Introduction to Animal Diversity 654
- 33 Invertebrates 666
- 34 Vertebrates 698

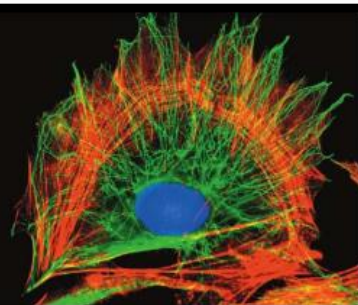
UNIT SIX Plant Form and Function

- 35 Plant Structure, Growth, and Development 738
- 36 Resource Acquisition and Transport in Vascular Plants 764
- 37 Soil and Plant Nutrition 785
- 38 Ancientness, Reproduction, and Biotechnology 801

2.

A Tour of the Cell

6



KEY CONCEPTS

- 6.1 To study cells, biologists use microscopes and the tools of biochemistry
- 6.2 Eukaryotic cells have internal membranes that compartmentalize their functions
- 6.3 The eukaryotic cell's genetic instructions are housed in the nucleus and carried out by the ribosomes
- 6.4 The endomembrane system regulates protein traffic and performs metabolic functions in the cell
- 6.5 Mitochondria and chloroplasts change energy from one form to another
- 6.6 The cytoskeleton is a network of fibers that organizes structures and activities in the cell
- 6.7 Extracellular components and connections between cells help coordinate cellular activities

OVERVIEW

The Fundamental Units of Life

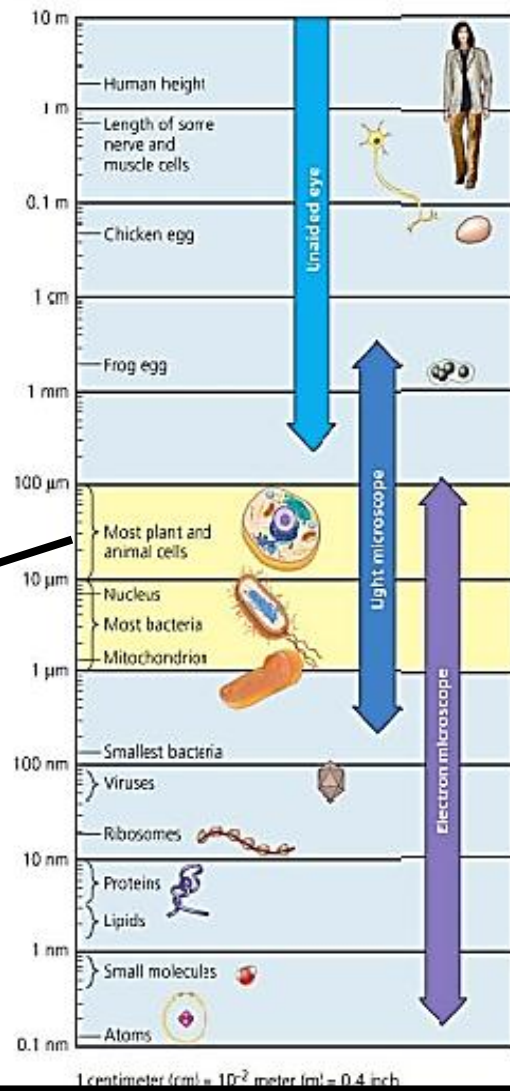
▲ Figure 6.1 How do cellular components cooperate to help the cell function?

Basic units of structure and function. The contraction of muscle cells is a process that involves the coordinated action of many cellular components. When you decide to move your arm, for example, you are making a decision that involves the brain, the nervous system, and the muscles. Each action of the body is a result of a complex interplay of these components.

The cell is the basic unit of structure and function. The contraction of muscle cells is a process that involves the coordinated action of many cellular components. When you decide to move your arm, for example, you are making a decision that involves the brain, the nervous system, and the muscles. Each action of the body is a result of a complex interplay of these components.

Although cells can differ substantially from one another, they share certain common characteristics. In this chapter,

this resolution is a hundredfold improvement over the light



8.2.2 LESSON 2: Physical Description Appropriation Stage

Timing: Six hours

Materials: Video beam, board, workshops, computers.

General objective:

1. The students will recognize the main characteristics and structure of a Physical Description.

Specific objectives:

1. The students will recognize technical terminology pertinent to Physical Description in life science domains.
2. The students will recognize the main grammatical structures involved with the construction of Physical description in life science textbooks.

Activity 1: *Formal Physical Description Structure*

Students will be led to a formalization of the figure's structure based on the textual context of academic reading and writing at university levels. The teacher will draft in general terms, what the description structure consists on, that is to say, what type of information is being displayed and in which way. The teacher will develop an outline of the structure precising its main components and he will put the figure in context placing it in two written examples.

Physical description: Physical descriptions draw on the characterization of physical properties of an object and the spatial relationships of the parts of the object to another and to the whole, and of the whole to other related objects. When precising these main components the teacher will clarify what kind of verbal structures are usually implied in accordance with the kind of physical properties that are being displayed through the statement. The teacher will illustrate five common physical properties that are usually found in life science basic texts: dimension, shape, material, color and texture.

Activity 2: Dimensions (Measurement units)

The teacher will comment that specific kinds of languages tend to be used when referring to measurements, for instance, measurement units. Measurement units are definite magnitudes of a physical quantity, a description of a reality in numerical terms. Hence, physical descriptions are structures that usually draw on measurement units to establish an informational activity. The teacher will draft some basic measurement units that are employed according to the International System of Units (metric system) and he will precise which of these units are more frequently used when carrying out measuring in life sciences. The teacher will illustrate in which kinds of scientific activities these languages tend to be more used, for example, images of some of the things that tend to be described in terms of these particular measurement units or objects that exert measurement-units-based assessments for their normal functions, for example, microorganisms under observation and laboratory equipment. The teacher will present the verbal structures that are usually proposed to establish physical descriptions under dimensional perspectives:

1. To be
2. To Have

The measurement languages will be exposed in the following order:

Length:	Volume:	Weight:
1. Centimetre - cm 2. Milimetre - mm 3. Micrometre - μm 4. Nanometre - nm	5. 1 milliliter - 0.001 litres - 1 cubic centimeter – cm^3	1. Centigram - cg 2. Milligram - mg 3. Microgram - μg 4. Nanogram - ng

At this point the teacher will add that drawing up descriptions that comprise appraisals on measurement units requires a proper understanding of how numerical references are written in English. Thus, the teacher will invite the students to recuperate basic

information on how to formulate cardinal and ordinal numbers and he will share with the students the structures that are used to express the most common numerical operations that are considered in life sciences issues.

The teacher will ask two students to come out to the board and represent a few numbers in words. The teacher will formulate several physical descriptions related to dimensions and the students will have to write them down on the board. The teacher will explain in which cases ordinal and cardinal numbers are usually found and he will show a few examples. The teacher will give the students workshop # 5 in which the students will carry out two exercises, the first one on physical descriptions making use of numerical references (ordinal and cardinal numbers). Once the students complete this point the students will find exercise # 2, a chart in which several numerical operations will be presented in words and the students will be required to match these specific operations with their respective numerical equivalents. The teacher will develop this exercise with the students collectively and he will treat each point of the exercise exploring with the students the meaning of each statement and leading the students to recognize the operation here involved.

Activity 3: Dimension (Locational structures)

Dimensions are alluded in order to localize or identify a position or direction of something. According to this, dimensions (length and weight) are usually referred through descriptions making use of specific verbal structures. The teacher may point at a couple of written examples in textbook's examples in the video beam making special emphasis on the verbal structures just exemplified:

1. **Position:** be, be found, lie, be situated, and be located
2. **Direction:** Be directed, lead, run, extend, pass, descend, and ascend.

The teacher will mention which prepositions tend to be related to positional verbal structures and which ones to direction structures. It will be imperative that the teacher shows in the video beam fragments of textbooks in which the students may be able to witness in which way certain prepositional constructions determine the verbal structures to be employed, for instance, a structure such as:

1. The trachea _____ from the pharynx to the junction of the main bronchi.

This physical description exercise, through the underlined prepositions, gives a hint on which kind of verbal structure is expected to be used, in this case, a structure that makes reference to direction and not position (from a point to another), such as: extends or descends.

Afterwards, the teacher will comment that in order to situate an element regarding a particular position or direction some important words need to be recognized, words known as locative adjectives and prepositions. The teacher will disclose a set of some of the most functional locative adjectives and prepositions in life-sciences textbooks' physical descriptions. Locative adjectives will be exposed showing couples related by antonymy with which he will signal at different parts of a typical prokaryotic cell image.

1. Right and left
2. Inner and outer
3. Upper and lower

4. Internal and external
5. Superficial and deep
6. Central and peripheral

Once the recognition of these locative adjectives is carried out, the teacher will comment on prepositional structures that may result useful for developing physical descriptions, the teacher will draw on three fragments of a textbook example in which he will point at some special prepositional structures that tend to be more recurrent in physical descriptions constructions. The teacher will outline a set of these prepositional structures on the board and he will describe some of their main functions quoting specific statements from textbooks examples. The following are the prepositions to be treated:

1. In
2. On
3. From
4. To
5. Beside
6. Next to
7. Above
8. Below
9. At
10. Between

The teacher will direct a remark in relation to some special terms that are used in life sciences to describe sections of the body or sections of a cell, inter alia. For this purpose the teacher will show a big image of a human body in which he or she will detail different sections of the body pointing at the planes that were just described, for example: a sagittal section of the eye, a coronal section of the pregnant uterus or a transverse section of the spinal cord. These terms:

1. Median
2. Sagittal
3. Coronal
4. Transverse or Cross-section
5. Oblique

Activity 4: Shapes

Shapes are notions to be considered when establishing physical descriptions as they offer very important information in reference to the physical reality that is being described. When generating physical descriptions shapes are usually alluded taking into account their dimensionality; two dimensional shaped and three dimensional shaped. In this way, nouns are deemed to be required to set a significant shaped-based description.

The teacher will exhibit a chart in the video beam in which two dimensional and three dimensional shapes will be submitted. Here, it will be shown an image of the shape in a “shape image column” and the noun attributed to this to the right column, “shape noun column”, a third column will be left aside empty. Once the students have recognized the shape terms the teacher will explain how these specific nouns tend to be transformed into adjective forms to perform special descriptions of any object. The teacher will mention that these adjective forms take usually a derived form from the noun figure. In relation to this, the teacher will ask the students to join him for filling the third column with the adjective form derived from the noun figures used to direct a remark to shapes.

Noun figures:

1. Circle
2. Semi-circle
3. Square
4. Rectangle
5. Triangle

6. Ellipse

7. Hexagon

Three dimensional:

1. Sphere

2. Cube

3. Cylinder

4. Cone

Adjective forms:

Two Dimensional:

1. Circular

2. Semi-circular

3. Square

4. Rectangular

5. Triangular

6. Elliptical

7. Hexagonal

Three Dimensional:

1. Spherical

2. Cubical

3. Rectangular

4. Cylindrical

5. Conical

Lines:

1. Straight

2. Curved
3. Crooked

Edges:

1. Round
2. Pointed
3. Hollow
4. Steep
5. Narrow
6. Broad
7. Flat
8. Solid

Activity 5: Exercising Location Structures

Having finished the previous activity the students will access the virtual campus to carry out three exercises in which the first three categories for grammatical analysis of this lesson (verbal, adjectival and prepositional structures) will be put into practice. The exercises will be presented this way:

Virtual exercise # 1: this exercise comprises a set of points into which students will have the chance to assess what kinds of verbal structures are more convenient in order to complete the physical description that is being exhibited.

The exercise begins with an introduction to the context into which physical descriptions are commonly depicted in life sciences domains, physiology or the study of the way in which cells agglomerate to create bigger systems that constitute the body of a living being. The exercise demands the students to establish a correlation between the structures that surround the gap to complete and the gap itself, in this case a knowledge about the prepositional context that frames each verbal structure promotes an easier inference of the word that fits better. The exercise also takes into consideration specific conjugation precisions that were presented prior the practice stage of the lesson and

from which some of the points may require the students to tell one verb from the other according to the conjugation that seems to match more accurately. Furthermore, passive and active voices as they were exposed during the first stage of the lesson, are important aspects to take into account at the moment to choose the best answer in this exercise

Información

Marcar pregunta

• Organs are distributed across the human body throughout a system that places each part in relation to other, there is no randomness in it. In an effort to establish scientific examinations scientists have drawn on physical descriptions to determine how all of these parts are distributed. Make use of the observational skills you possess as an scientist in training and offer an accurate description.

Pregunta 1

Sin responder aún

Puntuación como 1.00

Marcar pregunta

The lungs _____ on either side of the heart

Seleccione una:

☐ a.

Lie

☐ b.

Pass

☐ c.

Ascend

☐ d.

Run

Pregunta 2

Sin responder aún

Puntuación como 1.00

Marcar pregunta

The heart _____ above the diaphragm.

Seleccione una:

☐ a.

Are found

☐ b.

Passes

☐ c.

Is found

Pregunta 3

Sin responder aún

Puntuación como 1.00

Marcar pregunta

The trachea _____ from the pharynx to the junction of the main bronchi.

Seleccione una:

☐ a.

Lies

☐ b.

Extends

☐ c.

Is located

Pregunta 4

Sin responder aún

Puntuación como 1.00

Marcar pregunta

The trachea _____ anterior to the oesophagus.

Seleccione una:

☐ a.

Is found

☐ b.

Is

☐ c.

Lead

Pregunta 5

Sin responder aún

Puntuación como 1.00

Marcar pregunta

The oesophagus _____ downwards from the pharynx to the stomach.

Seleccione una:

☐ a.

Is located

☐ b.

Descends

☐ c.

Extends

Pregunta 6

Sin responder aún

Puntuación: 1,00

✓ Marcar pregunta

The liver _____ below the diaphragm.

Seleccione una:

☐ a.

Runs

☐ b.

Is directed

☐ c.

Is Located

Pregunta 7

Sin responder aún

Puntuación: 1,00

✓ Marcar pregunta

The optic nerve _____ from the retina into the cranial cavity.

Seleccione una:

☐ a.

Descends

☐ b.

Lies

☐ c.

Extends

Pregunta 8

Sin responder aún

Puntuación: 1,00

✓ Marcar pregunta

The biconvex lens _____ behind the iris.

Seleccione una:

☐ a.

Runs

☐ b.

Are found

☐ c.

Is located

Pregunta 9

Sin responder aún

Puntuación: 1,00

✓ Marcar pregunta

The aorta _____ through the diaphragm.

Seleccione una:

☐ a.

Is situated

☐ b.

Run

☐ c.

Passes

Pregunta 10

Sin responder aún

Puntuación: 1,00

✓ Marcar pregunta

The Eustachian tube _____ downwards from the middle ear and _____ into the pharynx.

Seleccione una:

☐ a.

Runs / Descends

☐ b.

Descends / Passes

☐ c.

Is directed / Lies

Consequently, **Virtual exercise # 2** will focus on offer a substantial practice chance for the students to establish clear differentiations among the kind of adjectival forms that underlie common physical descriptions in the topic that has been introduced during the sequence. Some of the points of the exercises are supported by links. These links lead the students to specific web pages into which they will find information that will help us to determine the location of the organs that are being exemplified.

Pregunta 1

Se responde con

Puntuación como 1.00

Marcar pregunta

The head is _____ to the feet.

Selección una:

☐ a.

Lower

☐ b.

Superior

☐ c.

Internal

Pregunta 2

Se responde con

Puntuación como 1.00

Marcar pregunta

The sternum is _____ to the heart.

Selección una:

☐ a.

Anterior

☐ b.

Upper

☐ c.

Medial

Pregunta 3

Se responde con

Puntuación como 1.00

Marcar pregunta

The left lung lies _____ to the heart.

Selección una:

☐ a.

Proximal

☐ b.

External

☐ c.

Anterior

Pregunta 4
Sin responder aún
Puntúa como 1,00
Pregunta

The humerus articulates at its _____ end with the radius and ulna.

http://www.orthoped.com/sites/default/files/imagetools/ultra_ultra_declarative_anatomy01.jpg

Selecciona una

- ☐ a.
Peripheral
- ☐ b.
Inferior
- ☐ c.
Superior

Pregunta 5
Sin responder aún
Puntúa como 1,00
Pregunta

The ulna is _____ to the radius.

<http://www.grandrampages.com/inspiration/03/ulna.jpg>

Selecciona una

- ☐ a.
Internal
- ☐ b.
Superficial
- ☐ c.
Parallel

Pregunta 6
Sin responder aún
Puntúa como 1,00
Pregunta

The stomach is situated _____ to the heart

Selecciona una

- ☐ a.
Lower
- ☐ b.
Deep
- ☐ c.
Medial

Pregunta 7
Sin responder aún
Puntúa como 1,00
Pregunta

The stomach is bordered on the _____ region by the vertebral column and its associated muscles.

Selecciona una

- ☐ a.
Central
- ☐ b.
Posterior
- ☐ c.
Lateral

Pregunta 8
Sin responder aún
Puntúa como 1,00
Pregunta

The phalanges are found at the _____ end of the limbs.

Selecciona una

- ☐ a.
Interior
- ☐ b.
Upper
- ☐ c.
Lower

Pregunta 9
Sin responder aún
Puntúa como 1,00
Pregunta

The pelvic cavity is _____ to the abdominal cavity.

http://upload.wikimedia.org/wikipedia/commons/thumb/4/e/Scheme_-_body_cavities-en.svg/200px-Scheme_-_body_cavities-en.svg.png

Selecciona una

- ☐ a.
Inferior
- ☐ b.
Inner
- ☐ c.
Central

Finally, **Virtual exercise # 3** aims at offering the students a practice on the kind of structures that are used to establish referential statements in a physical description. In this exercise the students will have to take into account the references they possess about each one of the anatomical structures cited here since according to those references they will be able to establish space relationships that will allow to employ accurately the prepositional forms that were worked in the sequence.

Pregunta 1

Sin responder aún

Puntaje como 1,00

Marcar pregunta

Eliminar pregunta

The heart lies _____ the thoracic cavity.

Seleccionar una:

☐ a.

Above

☐ b.

In

☐ c.

Next To

Pregunta 2

Sin responder aún

Puntaje como 1,00

Marcar pregunta

Eliminar pregunta

The ulna extends _____ the elbow _____ the wrist.

Seleccionar una:

☐ a.

Since / At

☐ b.

From / To

☐ c.

To / From

Pregunta 3

Sin responder aún

Puntaje como 1,00

Marcar pregunta

Eliminar pregunta

The liver is _____ the diaphragm.

Seleccionar una:

☐ a.

Besides

☐ b.

Below

☐ c.

Over

Pregunta 4

Sin responder aún

Puntúa como 1,00

🚩 Marcar pregunta
🏆 Grabar pregunta

The heart is situated _____ the stomach.

Selecciona una:

☐ a.

In

☐ b.

Above

☐ c.

At

Pregunta 5

Sin responder aún

Puntúa como 1,00

🚩 Marcar pregunta
🏆 Grabar pregunta

The ileum is found _____ the lower part of the abdomen.

Selecciona una:

☐ a.

At

☐ b.

Next to

☐ c.

Below

Pregunta 6

Sin responder aún

Puntúa como 1,00

🚩 Marcar pregunta
🏆 Grabar pregunta

The lingual nerve enters _____ the mouth from outside the pharynx.

Selecciona una:

☐ a.

From

☐ b.

Into

☐ c.

To

Pregunta 10

Sin responder aún

Puntúa como 1,00

🚩 Marcar pregunta
🏆 Grabar pregunta

The oesophagus descends to end _____ the stomach.

Selecciona una:

☐ a.

In

☐ b.

Above

☐ c.

At

Pregunta 11

Sin responder aún

Puntúa como 1,00

🚩 Marcar pregunta
🏆 Grabar pregunta

The lungs lie _____ the thorax.

Selecciona una:

☐ a.

In

☐ b.

Next to

☐ c.

Above

Pregunta 12

Sin responder aún

Puntúa como 1,00

🚩 Marcar pregunta
🏆 Grabar pregunta

The nostrils open _____ the pharynx.

Selecciona una:

☐ a.

From

☐ b.

Across

☐ c.

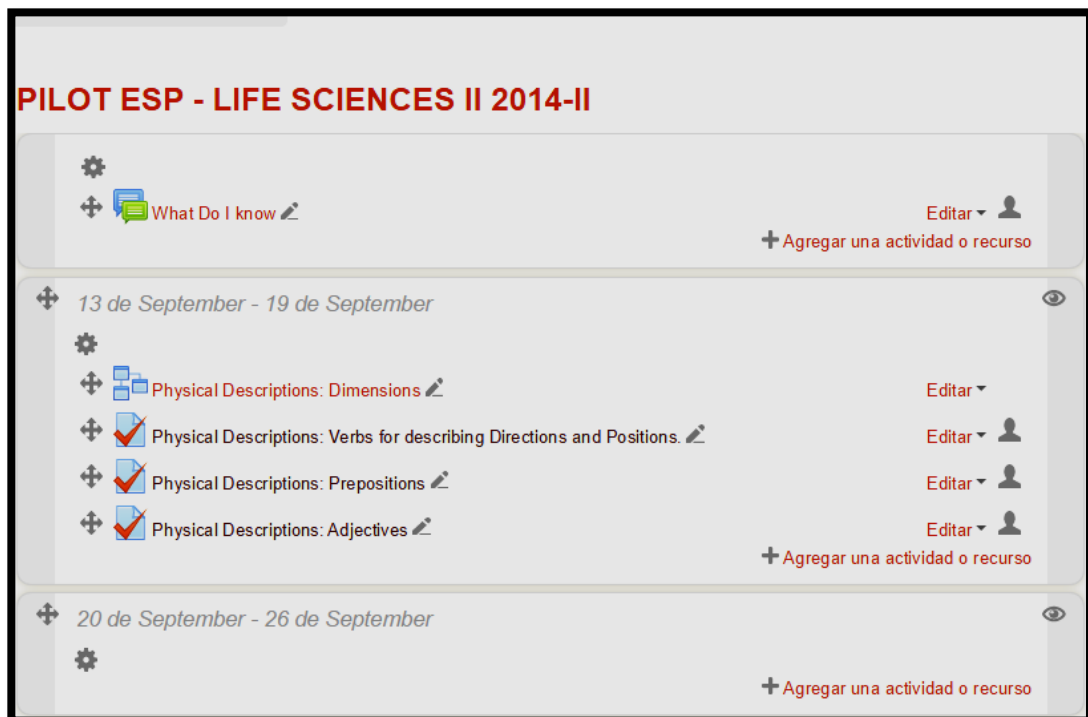
To

8.2.2.1 Operational details about the design of the virtual exercises

Univalle's virtual campus draws on Moodle, an open source learning platform designed for developing dynamic online courses. This platform offers a variety of tools to enhance learning projects such as: assignments submissions, forum for discussions, chat for instant messages, databases for record entries, glossaries, surveys for gathering information on the students, online quizzes, etc. For the purpose of this project the platform was employed to design evaluative activities that may help the students to interact with the information they were exposed to in a more facultative way.

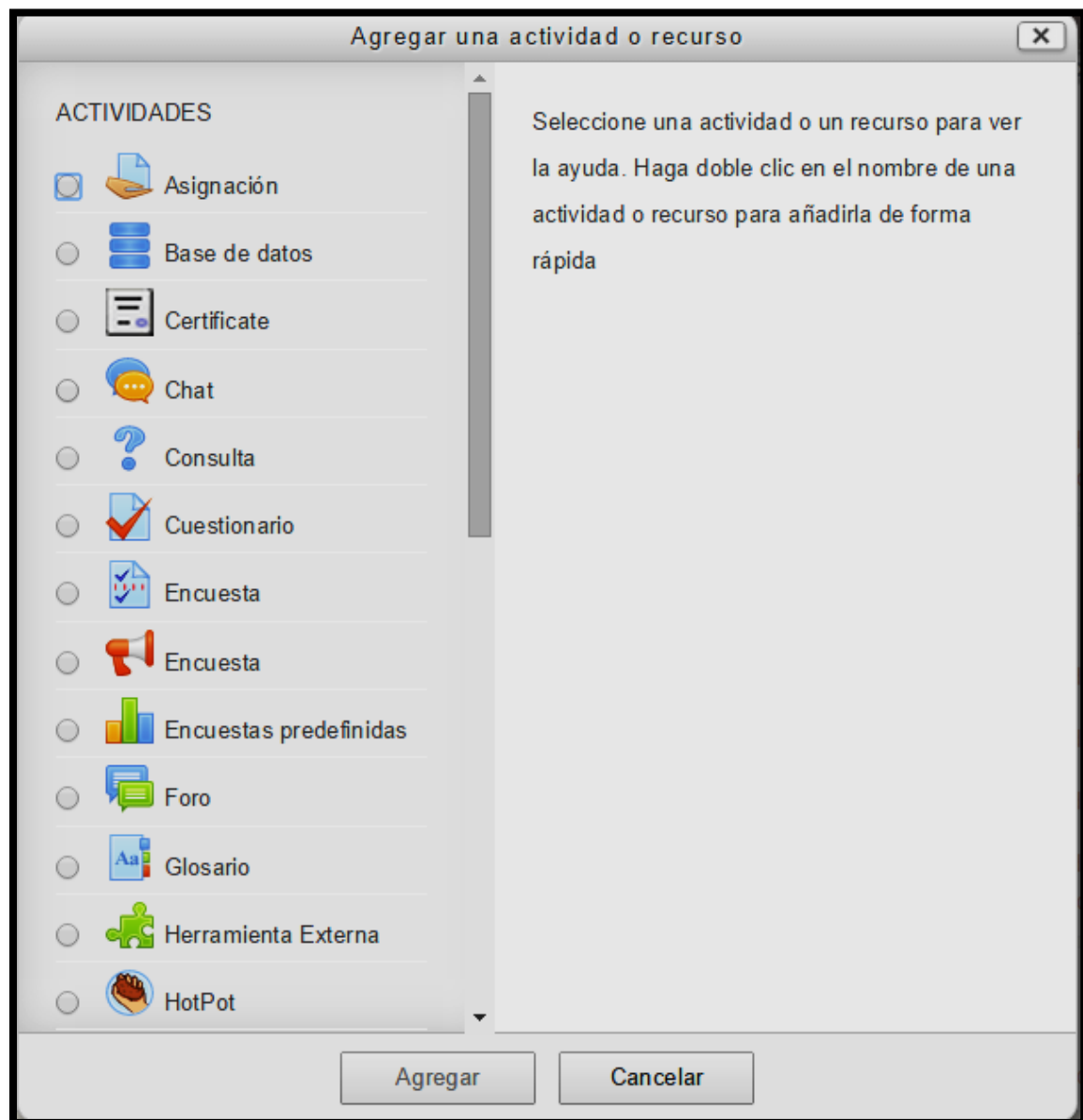
Students will be able to assess their own progresses in relation to the concepts exhibited previously without disregarding the possibility of re-elaborating what they know and re-applicate it through the same virtual evaluative stage. The above is conceived in view of the options guaranteed by the platform, such as assort of feedbacks through each answer option for the students to reevaluate what they wrongly have estimated and acquiring themselves a possibility of analyzing what they are being asked from a different perspective.

The first stage of the design interface of the virtual campus yields a simple panel in which the user (designer) is able to add an activity or resource presented in a frame of weekly sequences in which the students is expected to develop a periodical work.



Once the edition option is activated by the designer every week is prone to be modified by him making use of the different features exhibited by the platform. It is important to underline that the platform displays a very simplified and transparent interface with color that allow the main conceptual dispositions to stand out without being overshadowed by ornamented features of the page. In this way, the interface proffers a very academic environment to the users without demanding a wide knowledge about digital aids management by the students' side.

The spectrum of activities or resources offered by the platform embrace some of the following features:



For the purpose of this project the activity or resource selected from this range of options is the questionnaire (Cuestionario) in which three different evaluative activities are thought to be more efficiently disposed for the sake of more significant approach to the information exposed.

Once the questionnaire is created the platform yields a field to create questions. The questions are initially posed based on a basic description of the activity. This description is demanded by the platform before starting with the process of design of the questions. Here it is presented the format in its edition stage; i houses the descriptions or instructions proposed by the designer for the students.

Editando cuestionario: Physical Descriptions: Verbs for describing Directions and Positions.

? Ideas básicas sobre la realización del cuestionario
Total de calificaciones: 10,00 | Preguntas: 11 | Este cuestionario está abierto

Calificación máxima

Página 1

i

Physical Descriptions - L: ORGANS ARE DISTRIBUTED ACROSS THE HUMAN BODY THROUGHOUT A SYSTEM.

Descripción

1	1 THE LUNGS ON EITHER SIDE OF TH..	Puntúa como: 1 Guardar
2	2 THE HEART ABOVE THE DIAPHRAG..	Puntúa como: 1 Guardar
3	3 THE TRACHEA FROM THE PHARYN...	Puntúa como: 1 Guardar
4	4 THE TRACHEA ANTERIOR TO THE ...	Puntúa como: 1 Guardar
5	5 THE OESOPHAGUS DOWNWARDS...	Puntúa como: 1 Guardar
6	6 THE LIVER BELOW THE DIAPHRAG...	Puntúa como: 1 Guardar
7	7 THE OPTIC NERVE FROM THE RETI...	Puntúa como: 1 Guardar
8	8 THE BICONVEX LENS BEHIND THE...	Puntúa como: 1 Guardar
9	9 THE AORTA THROUGH THE DIAPHR...	Puntúa como: 1 Guardar
10	10 THE EUSTACHIAN TUBE DOWNWA...	Puntúa como: 1 Guardar

moodle/mod/quiz/edit.php?cmid=410891

Editando una descripción ⓘ

Usted tiene permiso para:

- Editar esta pregunta
- Mover esta pregunta
- Guardarla como pregunta nueva

i:

► Expandir

▼ General

Categoría actual: Por defecto en 00-PILOT_ESP_LIFE_SCIENCES_II-2014-II (32) ☒ Usar esta categoría

Guardar en categoría: Por defecto en 00-PILOT_ESP_LIFE_SCIENCES_II-2014-II (32) ▼

Nombre de la pregunta*: Physical Descriptions - Locating Parts of a Body

Enunciado de la pregunta*

Ruta: h1

Retroalimentación general ⓘ

► Marcas

► Creado / Último guardado

Guardar cambios Crear copia Cancelar

En este formulario hay campos obligatorios *

Enunciado de la pregunta:

Organs are distributed across the human body throughout a system that places each part in relation to other, there is no randomness in it. In an effort to establish scientific examinations scientists have drawn on physical descriptions to determine how all of these parts are distributed. Make use of the observational skills you possess as a scientist in training and offer an accurate description.

Once the instructions are determined the designer can start editing the formal questions of the activity. The option: **Agregar Pregunta**, allows the designer to move a step forward and choose from a set of kinds of questions delimited by Moodle the one that suits the purpose of the activity programmed for the students.

Elija un tipo de pregunta a agregar X

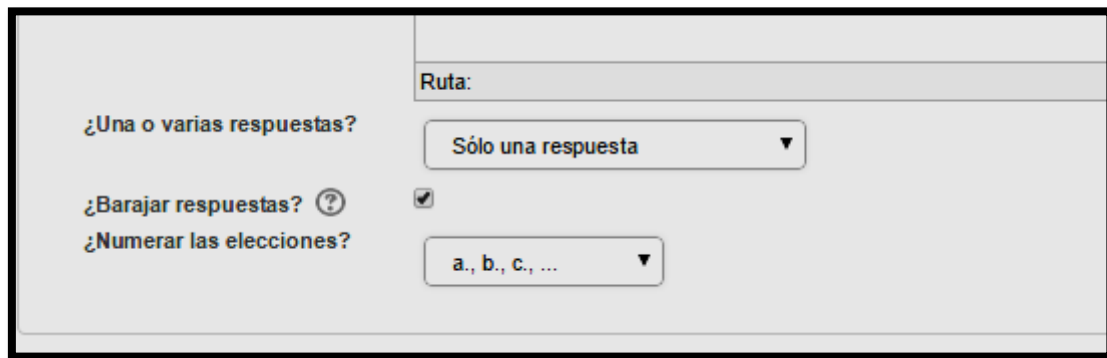
Seleccionar un tipo de pregunta para ver su descripción.

- ☒ Opción múltiple
- ☐ Verdadero/Falso
- ☐ Respuesta corta
- ☐ Numérica
- ☐ Calculada
- ☐ Ensayo
- ☐ Emparejamiento
- ☐ Emparejamiento aleatorio
- ☐ Respuestas anidadas (Cloze)
- ☐ Calculada opción múltiple
- ☐ Calculada simple
- ☐ Descripción

Siguiente Cancelar

In view of the project developed here the first kind of questions (**Opción Múltiple**) offered more suitable benefits for the sequence already designed by the teacher. Once this option is selected the designer continues with the process of question design. The platform delivers several kinds of options that constitute this type of question as a very efficient one when the teacher is looking forward to promote an evaluation that can be elastic or flexible to the students' knowledge background.

The first step is settling on a question. The platform offers an option for determining if one or more answers may be accepted from the students and another option for deciding over the possibility of having the answers order to be shuffled continuously by the platform.



The screenshot shows a configuration panel for a multiple choice question. It includes a 'Ruta:' label at the top. Below it, there are three settings: '¿Una o varias respuestas?' with a dropdown menu set to 'Sólo una respuesta'; '¿Barajar respuestas?' with a checked checkbox and a help icon; and '¿Numerar las elecciones?' with a dropdown menu set to 'a., b., c., ...'.

Once the question proposal is set up the configuration of the answer is the next stage to be carried out. The questions may be associated to a specific score, in this case, the scores assigned by default by the platform is 1. Hence, the answers can be arranged by the designer so they exhibit a degree of correctness in terms of percentages. This degree of correctness is either way adjusted by the designer, if he considers that the options displayed for the answers are not anything but a one only right answer chance, then the percentages for the other answers may be delimited to a very low percentage of correctness.

The screenshot shows the 'Respuestas' (Answers) section of a software interface. It contains two question entries, 'Elección 1' and 'Elección 2'. Each entry has fields for 'Calificación' (Grade) and 'Retroalimentación' (Feedback). A dropdown menu is open for the 'Retroalimentación' field of 'Elección 1', showing a list of percentage values: Ninguno, 100%, 90%, 83.33333%, 80%, 75%, 70%, 66.66667%, 60%, 50%, 40%, 33.33333%, 30%, 25%, 20%, 16.66667%, 14.28571%, 12.5%, 11.11111%, 10%, and Ninguno. The '33.33333%' option is currently selected. Each question entry also has a rich text editor with a toolbar containing icons for bold, italic, list, link, unlink, image, video, and document.

The interface of the campus provides the designer with another interesting tool to adjust the evaluation system to be proposed for the students. The designer can be able to determine if the students will be allowed to carry out secondary attempts to answer given the case they fail to respond accurately. What the interface showcases with prominent interest for creating a fair treatment of the evaluative exercise is a degree of penalization in terms of a decrease percentage in the score by question, that is to say, the student may have the chance to take over the question once again if he failed to answer correctly but if the question is responded correctly this time the score will be lower than if it had been the first attempt.

The screenshot shows the 'Múltiples intentos' (Multiple Attempts) section of the software interface. At the top, there is a dropdown menu for 'Penalización por cada intento incorrecto' (Penalization for each incorrect attempt) set to '33.33333%'. Below this, there are two hint sections, 'Pista 1' and 'Pista 2'. Each section has a rich text editor with a toolbar and a 'Ruta:' (Route) field. There are also checkboxes for 'Borrar respuestas incorrectas' (Delete incorrect answers) and 'Mostrar el número de respuestas correctas' (Show the number of correct answers) for each hint. At the bottom right, there is a button labeled 'Añadir otra pista' (Add another hint).

According to the previous guidelines three questionnaires were developed in order to enhance the students' performance in the development of descriptions of function:

PILOT ESP - LIFE SCIENCES II 2014-II

What Do I know

13 de September - 19 de September

Physical Descriptions: Dimensions

Physical Descriptions: Verbs for describing Directions and Positions.

Physical Descriptions: Prepositions

Physical Descriptions: Adjectives

The first activity looks forward to assess contents related to verbal structures in physical descriptions, the second activity aims at testing the students comprehension of the prepositional conditions of common physical descriptions and finally the third activity evaluates adjectival structures present in the kind of description previewed.

Pregunta 1
Sin responder aún
Puntaje como 1,00
Marcar pregunta
Editar pregunta

The heart lies _____ the thoracic cavity.

Selección una:

☐ a.

Above

☐ b.

In

☐ c.

Next To

Pregunta 2
Sin responder aún
Puntaje como 1,00
Marcar pregunta
Editar pregunta

The ulna extends _____ the elbow _____ the wrist.

Selección una:

☐ a.

Since / At

☐ b.

From / To

☐ c.

To / From



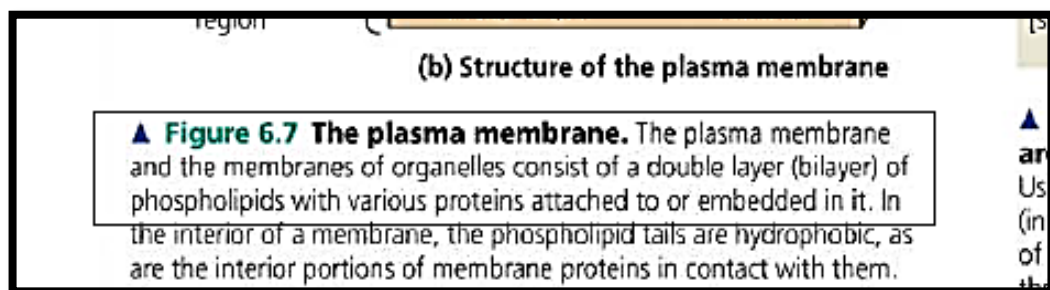
Universidad del Valle
Facultad de Humanidades
Escuela de Ciencias del lenguaje
Lectura de Textos Académicos en Inglés II
Prof. Juan David Martínez Caballero

Workshop # 5

Physical Descriptions – Language for measuring

Physical description: Physical descriptions draw on the characterization of physical properties of an object and the spatial relationships of the parts of the object to another, to the whole, and of the whole to other related objects. Let's identify a physical description in the following example:

Science Textbook # 1: Biology – 8th Edition – MCGRAW HILL, 2012.



The Language of Physical Descriptions:

Measurement units in Biology: Measurement units are definite magnitudes of a physical quantity, a description of a reality in numerical terms. Hence, physical descriptions are structures that usually draw on measurement units to establish an informational activity. Typical measurement units in Cell Biology measuring procedures are:

Length:

- Centimetre - cm
- Milimetre - mm
- Micrometre - μm
- Nanometre - nm

Volume:

1 milliliter - 0.001 litres - 1 cubic
centimeter – cm^3

Weight:

- Centigram - cg
- Milligram - mg
- Microgram - μg
- Nanogram - ng

Let's identify an example:

Science Textbook # 2: Concepts in Biology – 14th Edition – MCGRAW HILL, 2012.

4.2 Cell Size

Cells of different kinds vary greatly in size (figure 4.4). In general, the cells of Bacteria and Archaea are much smaller than those of eukaryotic organisms. Prokaryotic cells are typically 1–2 micrometers in diameter, whereas eukaryotic cells are typically 10–100 times larger.

Some basic physical principles determine how large a cell can be. A cell must transport all of its nutrients and all of its wastes through its outer membrane to stay alive. Cells are

Cardinal and Ordinal Numbers

1	one	1st	first
2	two	2nd	second
3	three	3rd	third
4	four	4th	fourth
5	five	5th	fifth
6	six	6th	sixth
7	seven	7th	seventh
8	eight	8th	eighth
9	nine	9th	ninth
10	ten	10th	tenth
11	eleven	11th	eleventh
12	twelve	12th	twelfth
13	thirteen	13th	thirteenth
14	fourteen	14th	fourteenth
15	fifteen	15th	fifteenth
16	sixteen	16th	sixteenth
17	seventeen	17th	seventeenth
18	eighteen	18th	eighteenth
19	nineteen	19th	nineteenth
20	twenty	20th	twentieth
21	twenty-one	21st	twenty-first
22	twenty-two	22nd	twenty-second
30	thirty	30th	thirtieth
40	forty	40th	fortieth
50	fifty	50th	fiftieth
60	sixty	60th	sixtieth
70	seventy	70th	seventieth
80	eighty	80th	eightieth
90	ninety	90th	ninetieth
100	a/one hundred	100th	hundredth
101	a/one hundred and one	101st	hundred and first
200	two hundred	200th	two hundredth
1.000	a/one thousand	1.000th	thousandth
10.000	ten thousand	10.000th	ten thousandth
100.000	a/one hundred thousand	100.000th	one hundred thousandth
1.000.000	a/one million	1.000.000th	one millionth

Write in words the cardinal or ordinal number of the digit and the measurement unit abbreviation if it's the case.

There are _____ (15) _____ (mm) from top to bottom of the organism.

This section has about _____ (150) _____ (cm³) of blood.

Cells are widespread living beings. They come in _____ (1) place in terms of adaptability.

Life has been evolving for millions of years and this is its _____ (3) billion year in development.

Match the items in each column.

	We say:	We write:	It equals:
1	ten to the power of six	6/10	5/10
2	ten to the power of two	0.5	1,000,000,000
3	ten times two	10 ²	1,000,000
4	ten divided by two	10 ⁶	0.6
5	three cubed	3 ³	20
6	six tenths	2,000,000,000 – 1,000,000,000	5
7	zero point five	10 ÷ 2	27
8	two billion minus one billion	10 x 2	100



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Lectura de Textos Académicos en Inglés II
Prof. Juan David Martínez Caballero
Workshop # 6
Physical Description: Locative Adjectives

Right and left

Inner and outer

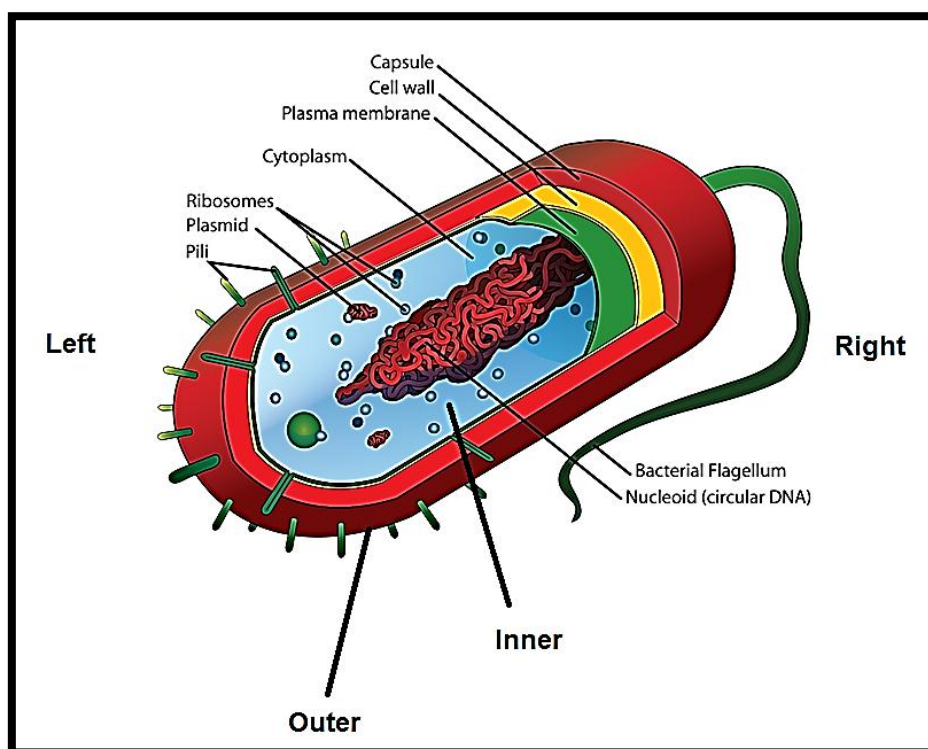
Upper and lower (Rather towards the top or the bottom of the body)

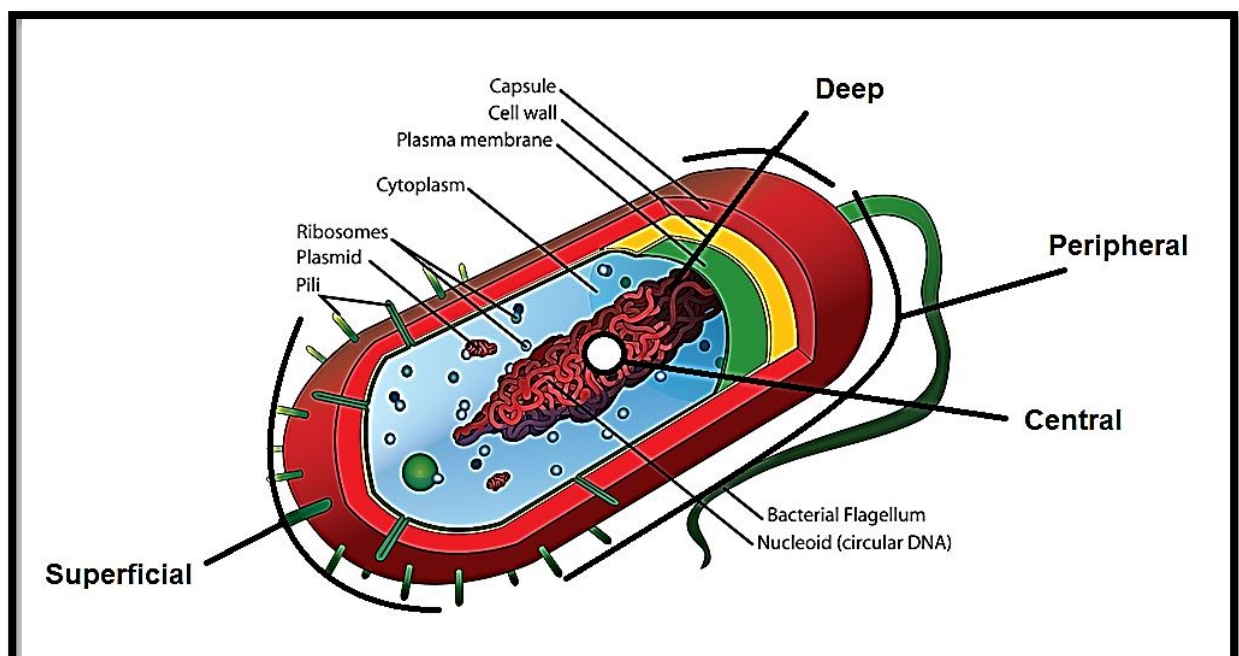
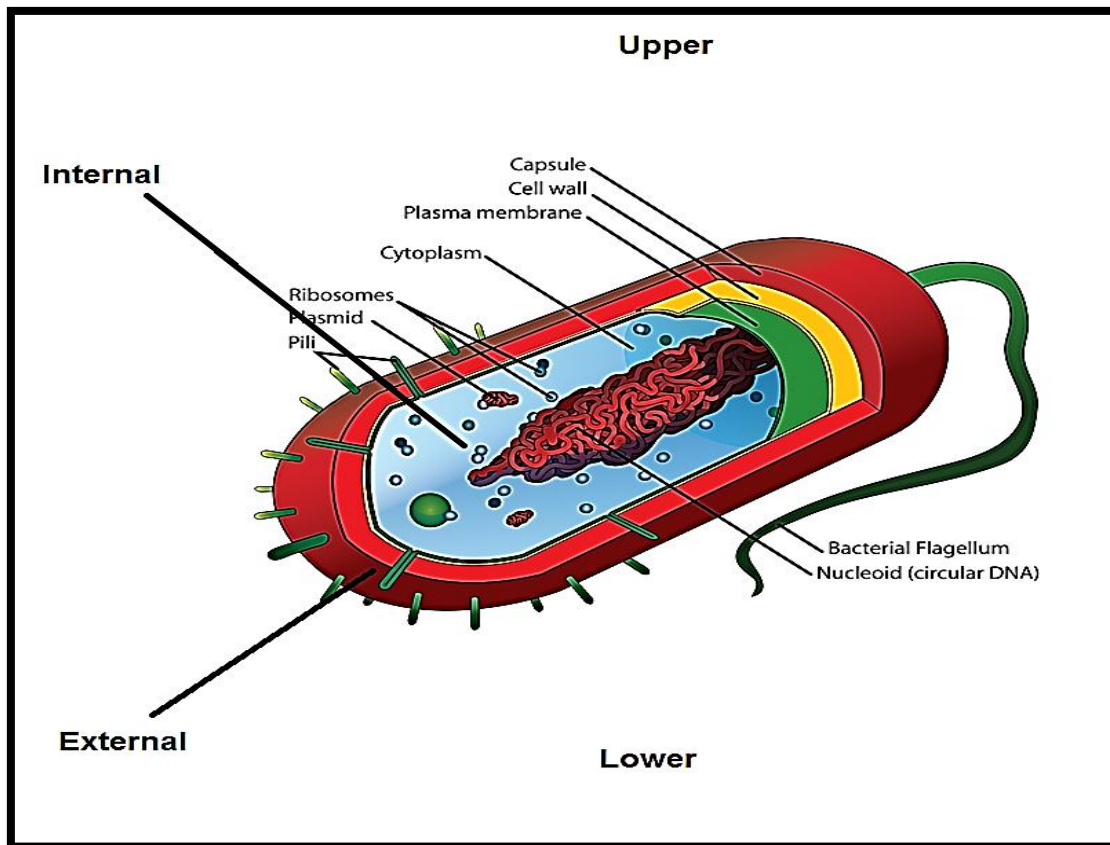
Internal and external (especially of hollow structures)

Superficial and deep (nearer and further from the surface of the body)

Central and peripheral (nearer and further from the center of the body)

Analyze the following diagrams of a typical prokaryotic cell:





According to the perspective of the previous images, choose adjectives from the two options provided to complete the following physical descriptions:

The signalized pili are at the _____ (left/right) end of the organism.

The ribosomes are in an _____ (inner/outer) space of the plasma membrane.

The ribosomes are in the _____ (upper/lower) side of the cell.

The bacterial flagellum is at the _____ (internal/external) face of the organism.

The pili are structures located at a _____ (superficial/deep) range of the cell.

The nucleoid is in the _____ (central/peripheral) zone of the cell.

8.2.3 LESSON 3: Function Description Appropriation Stage

Timing: Six hours

Materials: Video beam, board, workshops, computers.

General objective:

1. The students will recognize the main characteristics and structure of a Function Description.

Specific objectives:

1. The students will recognize technical terminology pertinent to Function Description in life science domains.
2. The students will recognize the main grammatical structures involved with the construction of Function description in life science textbooks.

Activity: *Description of Function*

The teacher will invite the students to take a look at some of the laboratory equipment vocabulary that he will present making use of the video beam so as to have them recognize these special tools that are put to use for establishing clear measuring descriptions of chemical phenomena. The teacher will direct clear remarks about the importance of these instruments in all life sciences fields whenever research or academic practices are being held. In order to attain that the teacher will access a document in which it will be briefly described the most common laboratory equipment and their functions.

The teacher will examine with the students the first laboratory tool and will ask them what kind of information is being presented beside the instrument. The students may agree that the information presented is introduced as a description. Thus, the teacher will invite the students to analyze if the kind of description that is being

formulated for describing these tools is also a physical description. From this point, the teacher will lead the students to recognize that in the majority of cases, the descriptions that are associated to the images do not correspond to a physical description form since the utensil is not necessarily being characterized in terms of its physical properties but rather according to the operational process the utensil is implicated in, that is to say, to its functions.

Introducing a secondary kind of description, description of function, from which the teacher will help the students to examine each of the laboratory tools exposed in the web site, he will remark that descriptions of functions are very commonly found in scientific texts such as the textbook. The teacher will continue exhibiting the document in which it will be shown each laboratory tool with its respective description and he will ask the students to recognize any common structure that, in those descriptions, seem to aim at describing the functions there involved. Once the students have carried out these inferential exercise, the teacher will precise the structure of a function description taking out as an example the next three tools presented in the document.

The teacher may propose the students to recall the Spanish equivalent terms of each tool is exhibited. As soon as the teacher finishes the exploration of each tool with the group he will pass around workshop # 6 in which students will be asked to determine which laboratory tool seems to be more useful for the purpose given in the worksheet. In order to do this the students should manage the basic function description structures explained so as to establish a clear recognition of each tool function.

Function Description:

Function descriptions offer information about the use or purpose of a device or mechanism. In order to proportionate this kind of descriptions several types of structures are usually employed considering also the particularities of the device whose function is intended to be described. Taking into account the particularities of some of the most common phenomena treated in basic life science issues certain structures are more commonly used, for instance, the verbal structures presented, as following: use, absorb, provide, facilitate, bring about, aid, assist, help, play an important part, etc.

Recurrent function descriptions in life sciences textbooks tend to be presented using the following forms:

1. The function of X is *to + verb*
2. X is concerned with *-ing form of verb*
3. X acts as *noun*.

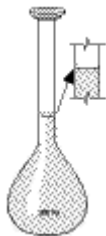
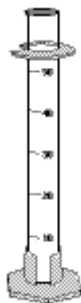


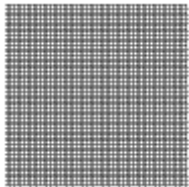
Universidad del Valle
Facultad de Humanidades
Escuela de Ciencias del lenguaje
Lectura de Textos Académicos en Inglés II
Prof. Juan David Martínez Caballero
Workshop # 7

Function Descriptions: Science Laboratory Equipment

You should learn the name of each piece and its basic use.

For exact volume measurements of liquids. Pipet on the left is a Volumetric pipet . It has only one graduation for delivering one exact volume. Pipet on the right is a Mohr pipet . It has graduations for delivering any number of exact volumes.	Pipet 	Chemical Spoon Used to transfer solids from their original container to a scale for weighing.	
Used in conjunction with a vacuum connection to a water faucet to speed up filtration.	Filter flask 	The Erlenmeyer flask is the most common flask in the DVHS chemistry lab. It is used to contain reaction solutions.	Erlenmeyer flask 

The rounded bottom of the Florence flask makes it ideal for boiling liquids. It also makes this flask easy to tip over when sitting on the lab table.	Florence flask 	The volumetric flask is used to make solutions. It has a precise graduation line in the neck of the flask. A solute is placed into the flask, then the solvent is used to bring the total volume up to the graduation.	Volumetric flask 
Beakers are the most versatile glassware in the lab and can be used for just about anything. The volume graduations on beakers should be used only for "ballpark" estimates.	Beaker 	Used to make accurate measurements of liquid volumes. The bumper ring on larger cylinders is to prevent breakage if tipped over. Keep it near the top.	Graduated cylinder 
This dish is used to recover dissolved solids by evaporation. While it can be heated, it should not be used for "strong" heating.	Evaporating dish 	A watch glass can be used like an evaporating dish for very small amounts of liquid. It can also be used to cover beakers.	Watch glass 
When attached to the ring stand, this iron ring is used to support glassware above the lab table.	Support ring 	When attached to the ring stand, this clamp is used to hold a large test tube or Florence flask	Utility clamp 

		above the lab table.	
Crucibles are used as a container when something requires "strong" heating.	Crucible and cover 	These tongs are used for picking up crucibles and crucible covers only .	Crucible tongs 
Used as a support for beakers when placed across a support ring.	Wire gauze 	Used to light a lab burner. Not a toy noisemaker during lab.	Striker
Used to grind solids into powders.	Mortar and Pestle 	Used to hold test tubes for short periods of "gentle" heating.	Test tube holder 
When lined with filter paper, used to filter suspended solids from a liquid.	Filter funnel 	Used for rinsing solids out of a container when filtering.	Wash bottle 

Identify which piece of laboratory equipment would be most useful for each of the following tasks:

1. Measuring exactly 43 mL of water : _____

2. Removing solid chemicals from a reagent bottle: _____.

3. Pouring 50 mL of liquid from one container to another

4. Holding 50 mL of boiling water: _____

5. Dropping small quantities of liquids into test tubes

6. Holding a test tube over a Bunsen burner for heating:

7. Protect your eyes from spattering solids and splashing liquids:

8. Determine if water is boiling: _____

9. Covering a beaker of boiling water to prevent splattering:

10. These five pieces of lab equipment would hold a test tube in a beaker of boiling water above a Bunsen burner:

11. Rinsing out glassware with distilled water: _____

12. Heating a dissolved substance in water to drive off water:

13. Holding hot objects in flame: _____

14. Heating substances to a constant temperature:

15. Transferring small quantities of liquid solutions from one container into

Another:

16. Measuring approximate amounts of liquids: _____

9 EVALUATION OF THE DIDACTIC SEQUENCE

The results of the evaluation procedure of the design result are contrived in the following section. Each axis with the indicators contained in it is described exhibiting the percentage of teachers that evaluated that specific criteria or indicator with that degree of the Likert-type scale, namely, a specific percentage out of a hundred percent (15 teachers). A qualitative interpretation is presented drawing on the numerical data that has been described before.

Objectives	Are well defined or can be easily inferred from the material.	TA: 80% – A: 20% – D: 0% – TD: 0% – DA: 0%
	Are coherent with the educational needs that urge to be looked after.	TA: 100% – A: 0% – D: 0% – TD: 0% – DA: 0%

Interpretation: Most of the revisers consider the objectives are well stated and clearly proposed. All of the teacher consider that the objectives are in complete relation with the specificities of the students the project has taken as educational target. A few teachers seem to feel unsatisfied with the way the objectives are proposed throughout the course of the sequence.

Motivation	Is appropriate to the target population the sequence is addressing.	TA: 66,7% – A: 33,3% – D: 0% – TD: 0% – DA: 0%
	Keeps the interest for achieving the objectives with a good efficacy level.	TA: 60% – A: 40% – D: 0% – TD: 0% – DA: 0%

Interpretation: A big amount of the revisers consider the motivational factors to be still lacking of appealing. A few were not in total agreement. Thus, a revision of the project might suggest that maybe some of the activities have a very intricate scientific orientation. In view of the above, some of the exercises may seem to concentrate on

very particularized aspects of the scientific discourse that is being aimed in the sequence. From this perspective, one may consider that the proposal does not produce the kind of mobility that is usually perceived in common English courses. At certain point, I dare to say that sometimes the lack of communication chances among the students arouse an impression of staticity in the language classroom. However, it is important to remember that the sequence aims at helping the students to establish mainly a communication between them and the text.

Activities	The methodology favors the active students' participation on their learning process.	TA: 73,3% – A: 26,6% – D: 0% - TD: 0% - DA: 0%
	Demand the students to solve problematic situations.	TA: 80% – A: 20% – D: 0% - TD: 0% - DA: 0%

Interpretation: Most of the revisers consider the activities to be effective and stimulating. A few teachers scored these points with “agreement”. I think some of the revises might feel that they don't entirely agree because the chances to establish a participational fluidity during the class seems to be associated to the chances to establish a conversational practice. It is important then to make a remark about the focus of the project, there is a concentration on aspects involved with reading processes specially.

Methodology	Is based on didactics principles that are in accordance to what is aimed to be taught.	TA: 100% – A: 0% – D: 0% - TD: 0% - DA: 0%
	Consistently makes use of methodological principles prone to be applied.	TA: 93,3% – A: 6,6% – D: 0% - TD: 0% - DA: 0%

Interpretation: Most of the revisers consider that the methodology is in total coherence with the objectives of proposal. The principles underlying the project were very clear and I think they succeed at permeating each aspect of the sequence. Furthermore, the

sequence itself suggest innovating principles for elaborating on works related to the same EAP field, principles in reference with curriculum design and pedagogical practices.

Materials and didactic sequence's reorientation	Is friendly, it is not threatening or aggressive.	TA: 66,7% – A: 33,3% – D: 0% - TD: 0% - DA: 0%
	Gives hints, clues or explanations before inviting to solve the problem.	TA: 60% – A: 20% – D: 20% - TD: 0% - DA: 0%
	Allows to know why the students has failed at certain instance.	TA: 86,6% – A: 13,3% – D: 0% - TD: 0% - DA: 0%

Interpretation: A big amount of the revisers consider the material is still intimidating and not accessible enough to students. The materials are evidently orientated towards a scientific domain in which the students are not going to feel as comfortable as they would feel in an ordinary English class. Probably, the environment is deemed to be more challenging for them since it is related to their study field but that does not reduce the impassivity of a proposal that leads the students to analyze language in a kind of discourse frame that is more complex than the ones that are usually approached in projects with no specific genre treatment.

Interface of Virtual Materials	The procedure for using the entering devices is simple for the typical user.	TA: 80% – A: 20% – D: 0% - TD: 0% - DA: 0%
	The way for consulting the available commands is simple.	TA: 80% – A: 20% – D: 0% - TD: 0% - DA: 0%
	There is consistence in the way the answers are asked to the user.	TA: 100% – A: 0% – D: 0% - TD: 0% - DA: 0%
	The speed of messages unfolding is appropriate for the user.	TA: 73,3% – A: 26,6% – D: 0% - TD: 0% - DA: 0%

	The size and kind of letters allow and fast and comprehensive reading.	TA: 100% – A: 0% – D: 0% - TD: 0% - DA: 0%
	The graphics and animation enrich what is being learned.	TA: 53,3% – A: 46,6% – D: 0% - TD: 0% - DA: 0%
	The vocabulary or terminology is appropriate to the cultural level of the user.	TA: 100% – A: 0% – D: 0% - TD: 0% - DA: 0%

Interpretation: Most of the revisers consider the virtual materials to be accessible and easy to be manipulated by the students. Yet there is common agreement in the sense that visuals aids still need to be improved. This finding is completely related to the fact that the virtual exercises that are proposed for the project are not supported by many visuals aids. The exercises then are not necessarily very invitational in their presentation.

Presentation of physical materials	There is consistence in the way the answers are asked to the user.	TA: 73,3% – A: 26,6% – D: 0% - TD: 0% - DA: 0%
	The size and kind of letters allow and fast and comprehensive reading.	TA: 100% – A: 0% – D: 0% - TD: 0% - DA: 0%
	The graphics and animation enrich what is being learned.	TA: 80% – A: 20% – D: 0% - TD: 0% - DA: 0%
	The vocabulary or terminology is appropriate to the cultural level of the user.	TA: 93,3% – A – D: 0% - TD: 0% - DA: 0%

Interpretation: Most of the revisers consider the physical materials to be accessible and easy to be manipulated by the students. Some of the revisers were not in entire agreement with the statement that assess the way the graphics and animations support the materials. However, in all fairness the visuals aids presented in the physical materials are a substantial component of the proposal. Some of the workshop actually

demands the students to examine these graphics in order to contribute with a written practice based on that.

Exercises or challenges	Allow to exercise and prove the mastering of each one of the objectives.	TA: 53,3% – A: 46,6% – D: 0% - TD: 0% - DA: 0%
	Their format corresponds to the level of the proposed objectives.	TA: 100% – A: 0% – D: 0% - TD: 0% - DA: 0%
	Are varied and enough so as to achieve the mastering	TA: 86,6% – A: 13,3% – D: 0% - TD: 0% - DA: 0%

Interpretation: Most of the revisers consider the exercises and challenges to be in coherence with the target group they were designed for. However there is common agreement about a lack of general treatment of all the objectives in all the exercises and challenges and a certain lack of possibilities to transfer the concepts that are being handled to other different contexts.

10 CONCLUSIONS

It is astounding how language is intrinsic to all the processes we cope with when elaborating knowledge. However, it is science the particular domain that arouses me the most profound interests and questions since this is the one that refers us to the most committed discourse, one that connects us passionately but rigorously with which I deem to be our ideal logic of existence, the desire to understand and transform our reality. Science discourse is specific and ambitious, thus language is required to be the same way.

The project of this undergraduate work was to offer a better chance to students and EAP teachers to approach scientific discourse, to examine it and put it in perspective from their own roles and necessities. The discursive approach adopted for this work allowed me to reach a clear understanding of the reality of the students I envisioned in terms of their relationships with the scientific field they are involved with and the text.

The revision of particular study field contexts comprised a series of analysis of the topic frames that were related to the target population the project intended to reach. Thus, there was a successful identification of the terminological and conceptual characteristics of the genres and content domains that were being treated. This revision allowed me to examine at a deeper extent the particularities of an academic discourse that lies behind the efforts of an English project.

That is how it was clear that in language teaching underlies a nature of the specific. In this manner, language is specific in the same degree human necessities are, hence, language teaching should encompass by default an orientation towards the specificities of the learner. But rhetorical and discursive approaches to communication studies tell us that genres model the way we interrelate to each other, the way we create knowledge. The way knowledge is constructed through this process is the departure point for elaborating an idea of necessity for envisioning an EAP project.

During the course of this project one of my objectives was to examine some of the structures underlying the discursive frames that were exhibited in the knowledge construction processes present in life sciences study fields. I consider I succeed

establishing a clear identification of the way the discursive frames could be fragmented to be analyzed and applied by students. That is to say, I consider I was successful establishing a way to examine the way specific language is constructed and processed.

Synthesis and integration is a core exercise for EAP teacher. An exercise that demands the teacher to have a clear understanding of how knowledge interrelates the abstract and the tangible. I consider, in general terms, my efforts were successful in reference with my purpose of creating a systematic proposal that integrates the aspects that were aimed.

This project aroused several questions in relation to the way language teaching may enhance the ways people access to knowledge. How can the understanding of foreign language contribute to the construction or conceptualization of knowledge? How far can English teaching go in order to go in depth in the exploration of the specific content field is getting involved with? These are questions that suggest several challenges in university level education.

My hopes are that, even when this proposal did not aim at developing a whole program for an entire course of EAP, the methodology proposed may offer an excellent point from which to continue a work that succeeds this either as a proposal for a teaching guide in ESP or a proposal for a textbook in EAP for life sciences.

11 REFERENCES

- Aparicio de Escorcía, B. et al. (1978). *La enseñanza de la comprensión de lectura en inglés*. Cali: Universidad del Valle.
- Aparicio de Escorcía, B. (1991). *La lectura como forma de acceso al conocimiento*. Cali: Universidad del Valle.
- Austin, J. (1975). *How to do things with words*. Cambridge, US: Harvard University Press.
- Barber, C. (1962). *Some measurable characteristics of modern prose. Contributions to English syntax and phonology*. Cited by Hutchinson and Waters (1987).
- Benavides, L. (2004). Propuesta pedagógica de enseñanza en inglés para propósitos específicos en una institución de media vocacional. Unpublished undergraduate thesis, Universidad del Valle, Santiago de Cali, Colombia.
- Chapelle, C. (2001). *Computer applications in second language acquisition: Foundations for teaching, testing and research*. Cambridge, UK: Cambridge University Press.
- Dudley-Evans, T. (1998). *Developments in English for specific purposes: A multi-disciplinary approach*. Cambridge, UK: Cambridge University Press
- Gumperz, J. (1982). *Discourse strategies (studies in international sociolinguistics)*. Cambridge, UK: Cambridge University Press.
- Doughty, C. & Long, M. (2003). Optimal psycholinguistic environments for distance foreign language learning. *Language learning and technology*, 7 (3), 50-80.
- Firth, J. (1957). *Papers in linguistics*. Oxford: Oxford University Press.
- Halliday, M. (1977). *Text as semantic choice in social contexts*. London: J.J. Webster.
- Herrera, O. (2009). Diseño e implementación de una secuencia didáctica para la escritura de textos argumentativos en francés lengua extranjera en el ambiente

virtual Lingweb. Unpublished undergraduate thesis, Universidad del Valle, Santiago de Cali, Colombia.

Hutchinson, T., Waters, A. (1987). *English For Specific Purposes: A Learning-centred approach*. Cambridge, UK: Cambridge University Press.

Hyland, K. (2004). *Genre and second language writing*. Michigan: The University Of Michigan Press.

Hymes, E. (1974). *Foundations in sociolinguistics: An ethnographic approach*. Pennsylvania: University of Pennsylvania Press.

Labov, W. (1973). *Sociolinguistic patterns (Conduct and communication)*. Pennsylvania: University of Pennsylvania Press.

López, G., De Candamil, E., López, J., Patiño, L., & Rangel, D. (1986). Inglés para propósitos específicos. Ciencias Naturales. Inglés I. Unpublished work, Universidad del Valle, Santiago de Cali, Colombia.

Mejía, A. & De Cobo, M. (1988). Inglés para propósitos específicos. Biología para inglés III. Unpublished work, Universidad del Valle, Santiago de Cali, Colombia.

Mishan, E. & Strunz, B. (2003). An application of XML to the creation of an interactive resource for authentic language learning tasks. *ReCALL*, 15 (2), 237-250.

Mountford, A. & Mackay, R. (1978). *English For Specific Purposes: A Case Study Approach*. London: Longman.

Mudraya, O. (2006). Engineering English: A lexical frequency instructional model. *English For Specific Purposes*. 25, 235-256.

Poupard, M. (2010). EAP vocabulary instruction: a textbook analysis and lesson template. Unpublished master thesis, San Diego State University, San Diego, United States.

Richards, J. (2006). *Communicative Language Teaching Today*. Cambridge, UK: Cambridge University Press.

Richards, J. & Rogers, T. (1986). *Approaches and methods in language teaching: A description and analysis*. Cambridge, UK: Cambridge University Press.

- Rodríguez, E. (2003). La Terminología y La Adquisición de Conocimiento Especializado. *Lenguaje*, 32, 93–117.
- Rojas, P. (2000). Genre analysis: a characterization of article introductions written by Colombian researches in English in Universidad del Valle. Unpublished undergraduate thesis, Universidad del Valle, Santiago de Cali, Colombia.
- Rosa, A. & Eschnolz, P. (1998). *Language: Readings in language and culture*. Mishawaka: Bedford/St. Martin's.
- Searle, J. (1980). *Speech act: theory and pragmatics*. Boston: Springer.
- Selinker, L. (1976). On the use of informants in discourse analysis and Language for Specialized Purposes. *IRAL*, 14 (1-3), 189-216.
- Shu-Chiao Sai. (2012). Integration of Multimedia Courseware into ESP instruction for technological purposes in higher technical education. *Journal of Educational Technology & Society*, 15 (2), 50-61.
- Stockwell, G., & Levy, M. (2006). *CALL dimensions: options and issues in computer-assisted language learning*. New York: Lawrence Erlbaum Associates, Inc.
- Swales, J. (1971). *Writing scientific English*. Sidney: Cengage Learning.
- Swales, J. (1990). *English in Academic and Research Settings*. Cambridge, UK: Cambridge University Press.
- Tarnopolsky, O. (2009). Content-based Internet-assisted ESP to Ukrainian university students majoring in Psychology. *The Reading Matrix*, 9 (2), 184-196.
- Torres, I. (2004). A pedagogical experience with ESP units at secondary level. Unpublished undergraduate thesis, Universidad del Valle, Santiago de Cali, Colombia.
- Trimble, L. (1985). *English for Science and Technology: A Discourse Approach*. Cambridge, UK: Cambridge University Press.

- Villareal de Zuluaga, T., Mera, M., & Abouchaar, A. (1994). *Medical English: conversational and scientific discourse*. Unpublished work, Universidad del Valle, Santiago de Cali, Colombia.
- Widdowson, H. (1973). An applied linguistic approach to discourse analysis. Unpublished PhD Thesis, University of Edinburgh, Edinburgh, Scotland.
- Widdowson, H. (1978). *Teaching Language as communication*. Oxford: Oxford University Press.
- Widdowson, H. (1979). *Explorations in Applied Linguistics*. Oxford: Oxford University Press.
- Widdowson, H. (1980). *Discovering discourse: Reading and thinking in English*. Oxford: Oxford University Press.



Universidad del Valle

Facultad de Humanidades

Escuela de Ciencias del Lenguaje

Programa de Licenciatura en Lenguas Extranjeras

Estimado Profesor(a):

Esta encuesta busca determinar qué tipo de competencias en inglés deben desarrollar los estudiantes durante el curso de lectura de textos académicos en inglés II en función de lo que el programa de _____ y su área demande. Los resultados serán tratados de manera confidencial. Agradezco su colaboración.

¿Quiénes Son Sus Estudiantes De Pregrado? Por Favor Descríbalos En Función De Las Siguietes Categorías:

Edad, sexo y nacionalidad.

Su percepción y actitud frente a las lenguas y culturas extranjeras.

¿Cuáles son esos intereses que parecen tener en común?

¿Cuál es su trasfondo socio-económico?

¿A qué tipo de enseñanza están acostumbrados?

2. El inglés es necesario para el estudiante de pregrado en biología de la Universidad del Valle para: (asigne a cada opción un número de 1 a 4 siendo el 4 el que designe la opción más relevante)

Interpretar artículos científicos pertenecientes al área de biología ____

Interpretar libros de texto en materia de biología ____

Interpretar noticias científicas concernientes al área de biología ____

Interpretar reportes de investigación concernientes al área de biología ____

¿De las siguientes unidades temáticas cuáles consideraría usted que son las más relevantes para el estudiante del programa de pregrado en _____ de la universidad del valle sin importar el énfasis que tome? (seleccione las 4 más importantes y asígneles un número siendo el 4 el que designe la opción más relevante).

La biología: la ciencia de la vida y concepto de esta misma ____

La unidad estructural de la vida: célula ____

Procesos de transformación de energía ____

Genética ____

Teoría evolutiva ____

Biodiversidad: los reinos de la vida ____

Anatomía y fisiología animal ____

Anatomía y fisiología vegetal ____

Ecología ____

Justifique su respuesta:

¿Cuáles considera usted que son las temáticas que menos documentación evidencian en la lengua materna (español)? Seleccione las 4 más importantes y asígneles un número siendo el 4 el que designe la opción más relevante.

La biología: la ciencia de la vida y concepto de esta misma ____

La unidad estructural de la vida: célula ____

Procesos de transformación de energía ____

Genética ____

Teoría evolutiva ____

Biodiversidad: los reinos de la vida ____

Anatomía y fisiología animal ____

Anatomía y fisiología vegetal ____

Ecología ____

¿Qué proporción de las lecturas obligatorias de semestre en su material están disponibles en inglés?

Ninguna _ 0-24%_ 25-49%_ 50-74%_ o más_

¿Considera usted que es importante manejar el inglés con el fin de graduarse del programa de _____?

Yes_ No_

APPENDIX B. Chart for the design results evaluation

When you finish revising the didactic sequence and the materials deliver an opinion on the points of each one of the following variables, enclosing into a circle the scale level that displays more accurately your opinion.		TA: In total agreement A: In agreement D: In disagreement TD: In total disagreement DA: It does not apply
Objectives	Are well defined or can be easily inferred from the material.	TA – A – D – TD – DA
	Are coherent with the educational needs that urge to be looked after.	TA – A – D – TD – DA
Motivation	Is appropriate to the target population the sequence is addressing.	TA – A – D – TD – DA
	Keeps the interest for achieving the objectives with a good efficacy level.	TA – A – D – TD – DA
Activities	The methodology favors the active students' participation on their learning process.	TA – A – D – TD – DA
	Demand the students to solve problematic situations.	TA – A – D – TD – DA
Methodology	Is based on didactics principles that are in accordance to what is aimed to be taught.	TA – A – D – TD – DA
	Consistently makes use methodological principles prone to be applied.	TA – A – D – TD – DA
Materials and didactic sequence's reorientation	Is friendly, it is not threatening or aggressive.	TA – A – D – TD – DA
	Gives hints, clues or explanations before inviting to solve the problem.	TA – A – D – TD – DA
	Allows to know why the students has failed at certain instance.	TA – A – D – TD – DA
Interface Of Virtual Materials	The procedure for using the entering devices is simple for the typical user.	TA – A – D – TD – DA
	The way for consulting the available commands is simple.	TA – A – D – TD – DA
	There is consistence in the way the answers are asked to the user.	TA – A – D – TD – DA
	The speed of messages unfolding is appropriate for the user.	TA – A – D – TD – DA
	The size and kind of letters allow and fast and comprehensive reading.	TA – A – D – TD – DA
	The graphics and animation enrich what is being learned.	TA – A – D – TD – DA

	The vocabulary or terminology is appropriate to the cultural level of the user.	TA – A – D - TD - DA
Presentation of physical materials	There is consistence in the way the answers are asked to the user.	TA – A – D - TD - DA
	The size and kind of letters allow and fast and comprehensive reading.	TA – A – D - TD - DA
	The graphics and animation enrich what is being learned.	TA – A – D - TD - DA
	The vocabulary or terminology is appropriate to the cultural level of the user.	TA – A – D - TD - DA
Exercises or challenges	Allow to exercise and prove the mastering of each one of the objectives.	TA – A – D - TD - DA
	Their format corresponds to the level of the proposed objectives.	TA – A – D - TD - DA
	Are varied and enough so as to achieve the mastering	TA – A – D - TD - DA
	Allow to transfer and generalize what is being learned to other contexts.	TA – A – D - TD - DA